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Special Edition:

ALPA Training Plans Committee Report...

The Air Line Pilot

MAY, 1958

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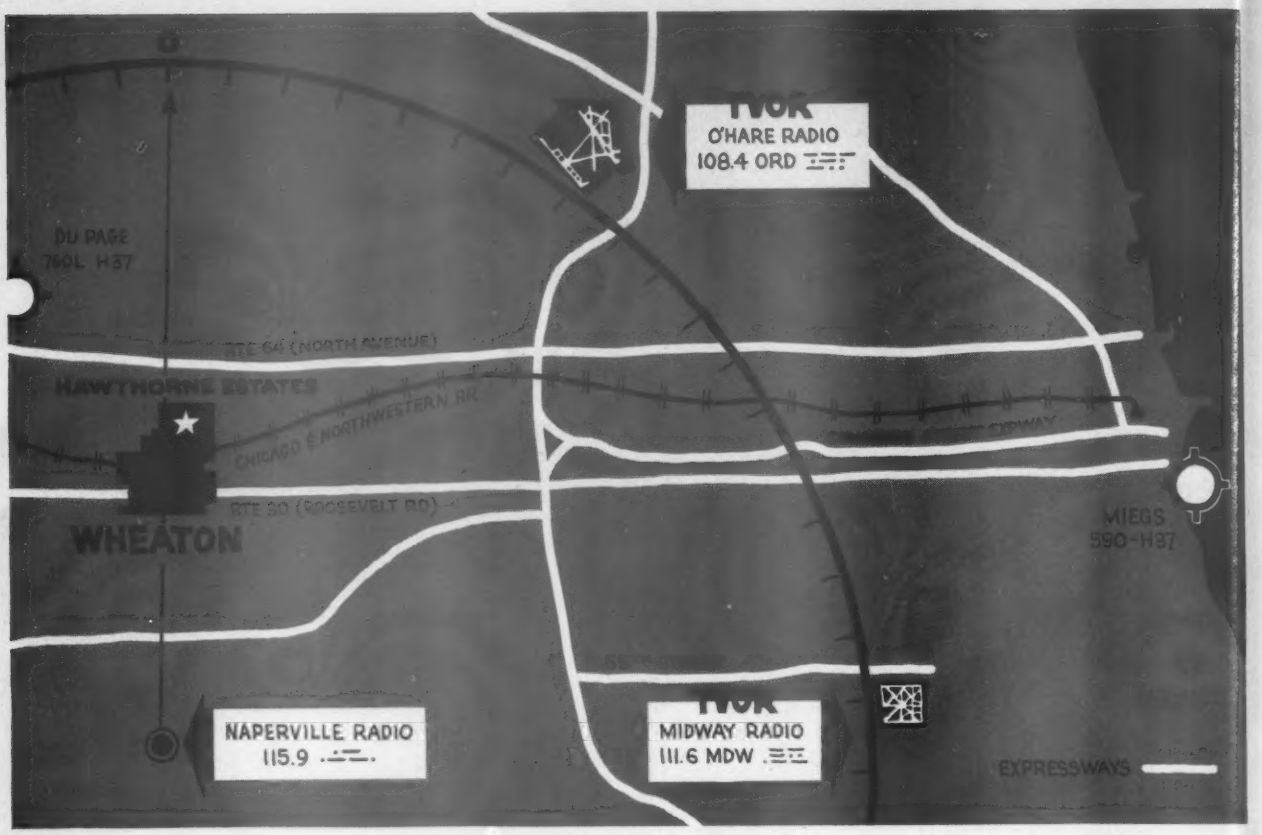

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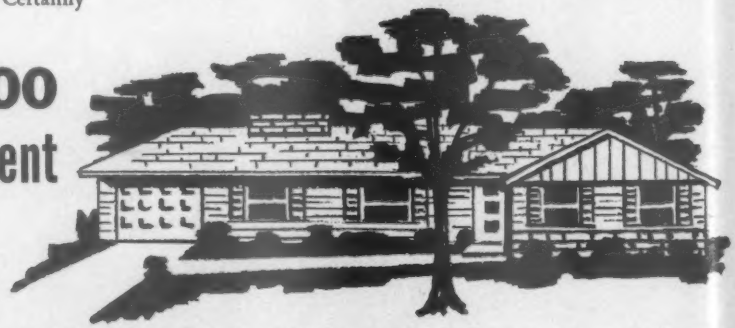

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On the Cover

Featured on this month's cover is the office of one of our new jet-liners—proud product of our nation's changing aircraft technocracy.

Like all technical changes, however, it has brought the problem of relating new concepts and the human factor to the genius of the machine.

In many respects simpler and more uncluttered than the cockpits of our present aircraft, it presents a deceptive picture of the far greater demands the new era will exact from flight crew members.

These demands will be in the form of greater responsibility, broader range of knowledge and skill, and need for a greater and more precise degree of co-ordination between all crew members.

Behind the cockpit will be far more passengers than ever before whose safety lies in the hands of the crew.

In the cockpit will be the reduced time element for action brought about by higher speeds and more critical performance and entirely new problems of high altitude flying.

Operational influences such as air traffic control, navigation, communications, and many others will impose still more demands on the crew.

How well flight crews are able to meet these demands will depend to a great extent upon the breadth of each crew member's individual training to function as part of a fast acting team rather than a collection of "consulting specialists."

For example, at present, on some air lines the copilot is not fully-qualified to relieve the pilot-in-command in case of incapacitation; neither the captain nor copilot can relieve the third crew member, and the third crew member cannot fly the airplane.

The remedy to this situation lies in complete reappraisal of initial flight crew licensing and qualification requirements and a training program made available in equitable degree to all crew members so skill and knowledge are equally distributed throughout the crew.

This special issue of THE AIR LINE PILOT *outlines the manner in which the Air Line Pilots Association feels this can best be attained.*

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ED MODES, Editor — AL LEACH, Asst. Editor

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(Report On ALPA Training Plans)

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(This special issue was prepared in conjunction with the ALPA Training Plans Committee)

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Technological Progress, As Symbolized By New Jets, Has Raised Many Questions Associated With Training Progress

PILOT TRAINING: The Status and Need

AIR transport is today undergoing one of the most radical changes in all of its history: *A transition to whole new operational concepts.* The catalyst precipitating this change is technological advancement. It is dramatically evident in the new turbine-powered aircraft and present, even though more subtly, in current equipment. The full import of this vast change will be felt in some proportions this year, in greater degree next year, and probably with full force by the year after that.

This new era will bring greater responsibility than ever to everyone connected with air transport operational aspects —the air line companies, the federal aviation agencies, the air line pilots and all flight crew members.

Coming to the fore at this critical time, as a basic requirement of fulfilling this responsibility, is the important element of evaluating training methods, procedures and objectives and relating them to the technological and operational changes taking place—an inescapable problem that must be met face-to-face and solved within a comparatively short period of time.

Behind the Conclusions: A Broad Program

Several years ago, the Air Line Pilots Association launched a broad program of study aimed at the solution of this problem. The nucleus of this wide-spectrum research, carried on by specially-established committees of qualified pilots, representing the expenditure of considerable money, many man-hours of work, and a candid appraisal of the role of flight crews in the new era, included:

- *Study and evaluation of all new aircraft and the changes in technology they represent.*
- *Thorough review of air line pilot licensing requirements.*
- *Research into physical standards for air line pilots.*
- *A complete study of present training methods, evaluation of their weaknesses and insufficiencies, and the development of a sound approach to training in the future.*

While each of these subjects represented a separate area of individual research, they all, to a degree, touched upon overlapping subjects and developed basic facts supplementing each other and merging logically into a total program and overall conclusions.

For example: ALPA's aircraft evaluation on the Boeing 707, Douglas DC-8, and Lockheed Electra all indicated that the new aircraft will be far more critical than present aircraft, will impose a greater necessity for crews to acquire all skills related to their operation, will require more cockpit teamwork and coordination.

Another example relating to licensing requirements:

On some air lines today only the pilot-in-command, out of a three-man crew, is qualified to operate the aircraft, meaning even slight incapacitation of any crew member can create an emergency. The full meaning of this is emphasized by studies conducted by the ALPA Physical Standards Committee indicating that such incapacitation is far more frequent than is commonly realized.

One Of The Responsibilities Brought By Technological Changes Is The Serious Obligation Of All To See That Our Airliners Are Manned By Fully-Trained Crews

It is because of factors such as these that pilot training has become one of the most important, if not the single most important, item facing us today.

At the 14th Convention, a Pilot Training Plans Committee was established "to study and formulate a detailed ground and air training curriculum for all pilots on all types of equipment." Appointed to accomplish this assignment were Captain E. R. Watson (EAL), Chairman; Captain D. L. Leonard (NWA), and Captain Steve Gondek (MOH), who represented widely divergent types of operations, as well as great variance in type of equipment.

The results of their work—a comprehensive program of pilot training, standards and recommendations which on February 20, 1958, were approved by the Association's Board of Directors as ALPA policy—is covered in detail in other articles by members of the ALPA Pilot Training Plans Committee comprising this Special Pilot Training Edition of The Air Line Pilot.

Some of the background leading up to the Committee's recommendations, however, will probably be of interest to fully understand the thoroughness and candidness with which the entire subject was approached.

Areas of Committee Research

The ALPA Pilot Training Plans Committee investigated and evaluated current pilot training philosophies and objectives. They studied training personnel, techniques, methods and environments. They paid particular attention to training aids such as flight simulators, procedural trainers, cockpit familiarization trainers and system training displays.

Analysis was made of the various stages of flight training programs, including initial, probationary, upgrading and transition training. Route qualification and the maintenance of a high level of proficiency were also considered a part of training, and techniques in these areas were sought out.

In their work, the committee studied the training operations of American, Braniff, Capital, Eastern, Mohawk, National, Northwest, Pan American, Trans Canada, TWA, and United Air Lines. They called on Boeing, Convair, Douglas, Lockheed, simulator manufacturers, various components of the U. S. Air Force, the CAA training center at Oklahoma City, the CAB, and the University of California.

Much of the committee's efforts were directed toward the problems to be encountered in the transition to turboprop and jet transports. Such new sub-

The ABC's Of The Flight Crew Training Problem

A

TODAY'S TRAINING METHODS ARE OBSOLETE AND DEFICIENT BECAUSE:

- ***They concentrate training in some crew members to the exclusion of others.***
- ***They rely on on-the-job training instead of thorough pre-job training.***
- ***They result in an actual dilution of cockpit skills of some crew members.***
- ***They fail to achieve maximum coordination of cockpit duties between crew members.***
- ***They are only minimal and marginal in some cases, even below minimum in others.***

B

THESE WEAKNESSES IN AIR CREW TRAINING PROGRAMS HAVE BECOME EVIDENT:

- ***By past accidents which have been directly attributable to insufficient training.***
- ***By the lack of completely trained crews on some air lines.***
- ***By the serious challenge now posed by the jet age where proper training programs will become more imperative than ever.***

C

THE SOLUTION LIES IN FULL CREW TRAINING THROUGH PROGRAMS:

- ***That provide coordinated training for all crew members.***
- ***That are realistic and uniform.***
- ***That cover all types of equipment.***
- ***That result in increased cockpit efficiency.***
- ***That are monitored to meet Civil Air Regulations.***

(To overcome weaknesses of present training programs, the Board of Directors of ALPA established a special Training Plans Committee in 1956. Its report and recommendations for a training program and methods necessary to retain the skill and proficiency levels of cockpit crew members have now been approved as Association policy.)

PILOT RESPONSIBILITY: With these seats in the jets filled with 100 to 200 passengers, the pilot's responsibility becomes greater than ever.

jects as the turbine engine, swept-wing aerodynamics, rapid and explosive decompression, and high altitude indoctrination were extensively discussed and reviewed with the most qualified people in these fields.

Status of Current Programs

The committee discovered that some few air lines had made considerable progress in training, others lagged seriously. All training programs could be improved. Civil Air Regulations concerning training, they found, were not in themselves a guarantee of adequate training. As *minimum* rules of the air transport industry for establishing a training program, they are necessarily broad and flexible and lend themselves to loose interpretations. Such words as "adequate," "sufficient," "appropriate," and "necessary," are used freely. Therefore, in establishing pilot training programs, air carriers take advantage of such words to provide *less* than the minimum. In some cases, attempts to save money have reduced pilot training to little more than a paper program. These broad and divergent interpretations of the training regulations are one of the reasons for an Association directed study. It is understandable that variances in air line operations would make their training programs differ in some respects. However, a particular aircraft system requires the same normal and emergency operation by a pilot in any part of the country. The same malfunctions will occur and the same remedial actions will be necessary on the same model aircraft regardless of the area or type of operations.

Aircraft performance characteristics are well established by engineering data and proved by flight testing. The aircraft will respond the same under a given set of conditions regardless of what uniform the pilot wears.

Since the industry has been successful in removing from the Civil Air Regulations any approval of a carrier's training program by the Administrator, little can be done now to force a minimum standard. Thus, the primary reason for the report is to arrive at a realistic training standard for all pilots on all types of equipment and attempt to have all carriers at least comply with the minimum.

Monitoring Essential

To accomplish this, the committee recommended that the Civil Aeronautics Administration's authority to monitor and approve the training programs of the air carriers be restored so that the CAA can assist ALPA in maintaining the minimum standards in this report.

The only reason for training of the air line pilot is to increase and maintain his level of proficiency, thereby assuring a safe, efficient, and economical operation. The report states:

"Through training, a pilot is provided the knowledge to make quick, accurate decisions. Complete understanding of the new turbo-prop and jet type aircraft, with the many new concepts involved, will be of utmost importance. With one unit of equipment costing up to six million dollars and the lives of up to two hundred passengers involved, the utmost care must be exercised. Even today's piston-engine driven aircraft involve several millions of dollars per unit and a hundred plus passengers in some configurations.

"In the past, many aircraft accidents have been attributed to insufficient training and/or lack of dissemination of information to the pilot. With today's rapidly growing air transport industry, these deficiencies can no longer be tolerated.

"Throughout the committee's travels it was apparent that there was not any one training program that could not be improved," they said.

Unsound Economics

The committee was well aware of the fact that pilot training costs money. It is also aware that training costs are difficult to measure in any tangible manner, except in those accidents where it is recognized that the cause developed out of a training deficiency. With the rapid growth taking place in air transportation, the scheduled carriers are being forced to assume great responsibility and liability and their training costs should be deemed as important as their operating or maintenance costs in bringing maximum air safety to the air-traveling public. Since the pilots are the direct operating representatives of the carrier delivering the final product, any dilution of training standards is an unsound compromise with safety and economy.

An aircraft, though a magnificent and complicated machine, is subject to the same mechanical laws that govern any other physical object. It has weight, mass, exerts forces and has forces exerted upon it, and is subject to mechanical failures and physical deterioration.

Performance of this machine can be measured in precise qualitative amounts. Every airplane is certificated and licensed to be operated within these precisely known performance values. These values are known as Transport Category Rules and are designed to give equivalent safety to all types of airplanes in all types of operations. Further, there are some safety margins in these Rules that provide a buffer for performance deterioration.

No pilot can get more out of an aircraft than the power and weight factors will allow, but by lack of knowledge and inadequate training, he will get a lot less performance. This is the philosophy behind the Association's Training Plans Program.

CAR 40.280 Training Requirements:

Strict Compliance With Full Intent Of Minimum Rules Are Necessary For Proper Aircraft Crew Training

"General:

"Each air carrier shall establish a training program sufficient to insure that each crew member and dispatcher used by the air carrier is ***adequately*** *trained to perform the duties to which he is to be assigned.*

"Each air carrier shall be responsible for providing ***adequate*** *ground and flight training facilities and* ***properly*** *qualified instructors.*

"The training for each flight crew member shall consist of ***appropriate*** *ground and flight training, including* ***proper*** *flight crew coordination.*

"40.281—Initial Pilot Ground Training:

*"****At least*** *the following:*

"(a) Carriers operating specifications. Emphasis on operation and dispatching rules and airplane operating limitations.

"(b) Dispatch procedures and ***appropriate*** *contents of manuals.*

"(c) Duties and responsibilities of crew members.

"(d) Study of airplane to be flown, including all major components and systems, performance limitations, standard and emergency operating procedures.

"(e) Principles and methods of determining weight and balance limitations for take-off and landing.

"(f) Navigation and use of ***appropriate*** *aids to navigation, including the instrument approach facilities and procedures which the carrier is authorized to use.*

"(g) Airport and ATC systems and procedures and GCA, if pertinent to the operation.

"(h) Meteorology sufficient to insure a practical knowledge of the principles of icing, fog, thunderstorms, and frontal systems.

"(i) Procedures for operation in turbulent air and during periods of ice, hail, thunderstorm, and other potentially hazardous meteorological conditions.

"40.282—Initial Pilot Flight Training:

"(a) Take-offs and landings during day and night.

1. *Normal maneuvers.*
2. *Emergency maneuvers.*
3. *Simulated instrument conditions in aircraft.*

"(b) Pilot in command.

1. *V_1-V_2 take-off.*
2. *Two-engine climb in four-engine aircraft at maximum landing gross.*
3. *Simulated pull-out from landing and approach configuration at a safe altitude with critical engine inoperative.*
4. *Make instrument approaches using all authorized navigational facilities available.*

"40.286—Initial Crew Member Emergency Training:

"(a) The training in emergency procedures shall be ***designed*** *to give each crew member* ***appropriate*** *individual instruction in all emergency procedures, including assignments in the event of an emergency, and proper coordination between crew members.*

Procedures to be followed in the event of failure of ***engine*** *or* ***engines*** *or other airplane component or systems, emergency decompression, fire in the air or on the ground, ditching, evacuation, the location and operation of all emergency equipment, and power settings for maximum range and endurance.*

"(b) Synthetic trainers may be used where the trainers sufficiently simulate flight operating emergency conditions.

"40.302—Pilot Checks:

"(a) Line checks.

"(b) Six-month check. ***Pilot in command.***

1. *Instrument approaches using facility authorized for lowest minimums. Others may be done in simulator.*
2. *V_2 take-off and climb out.*
3. *Two-engine climb in four-engine aircraft at maximum landing weight.*
4. *Simulated pull-out from landing and approach configuration at a safe altitude with critical engine inoperative."*

Whether Fully-Qualified Crews Occupy The Cockpit Seats In Either Jets (Left) Or Present Equipment (Right) Will be Determined By Training Plan

TRAINING: Importance Of The Carrier's Program

Marginal Training Programs, Specialization, Reduction In Amount Of Knowledge Available to Pilot Is False Economy That Cannot Be Condoned In Today's Operations

By Capt. E. R. Watson

Chairman, ALPA Training Plans Committee

IN ancient history we find many examples where the exclusive possession of knowledge has been used by the rulers of the land and their high priests to exercise control over their subjects and maintain a superior position. As ways and means were found to gain access to and disseminate this knowledge the barrier between ruler and his subjects began to crumble. The possession and dissemination of knowledge was the common denominator that led mankind out of the dark ages into the atomic age.

Strange as it may seem this ancient high priest philosophy is still practiced to a degree in the pilot training programs of the nation's scheduled air carriers. That is, a few selected individuals are permitted to participate in extensive manufacturer's training programs while the working pilot receives the highly condensed, bare minimum training to get by on.

Concentration of Training Illogical

In addition, one individual crew member is selected to receive the bulk of the system's training; thereby imparting to this individual an assumption of authority. Such an approach to training is a result of false economy measures taken to keep training expenses to a minimum. The fact that the pilot in command, charged with the safety of the flight, has been able to maintain his professional standing in the face of these obstacles is a tribute to those men. Current training methods in no manner reflect the true concept of piloting standards in which the crew must be able to work as a coordinated unit in the cockpit.

In the Mail Wing days, a pilot's job was considered 80 per cent risk and 20 per cent skill and responsibility. When the first passenger entered the picture the responsibility and mental element became a larger part of the pilot's job. The demands of society, processed through the CAA, established standards for judgment and knowledge.

Today, statistics will show, although many pilots will disagree, that the risk element has been reduced. Although inherently a hazardous occupation, the risk element has been lowered by increased experience, knowledge and skill on the part of the pilot and others.

However, with this increased experience, knowledge and skill, it still remains absolutely imperative that pilot training be at a level where the pilot's knowledge is constantly improved. Marginal training programs, "specializing," and any reduction in the amount of knowledge available to the pilot cannot be condoned.

Little Experience For New Era

Within the next year the entire scheduled air carrier industry will be going to school. The pioneer 20-year veteran will be there along with the apple-cheeked first-year copilot. The whole industry will enter the turbo-prop and jet era together and there is very little post commercial operating experience to draw from. The new turbo-prop and jet aircraft will come from the manufacturer and after concentrated testing and certification programs, they will go into scheduled operation. The burden of transitioning the veterans and the newcomers into the turbo jet and jet aircraft

will of course fall upon the carriers' training organization.

As the Training Plans Committee pointed out in their report:

"Training programs in the air line industry range between those predicated on the 'utmost-care' philosophy which provide every training aid and facility to enable their pilots to execute their duties in a safe and efficient manner, and their complete opposites which are based on the 'calculated-risk, play-it-by-ear' philosophy. Training which embraces this 'calculated-risk, play-it-by-ear' philosophy leans heavily on the pilot's ability to somehow, sometime, somewhere, pick up the information as he goes along and has no place in the maturing air transport industry of today.

"With the introduction of the turbine-powered aircraft, all air line pilots will enter this new era together. *There should be no mysterious nor jealously guarded operational secrets in the industry.* The first accident involving the loss of a multi-million dollar turboprop or jet aircraft will affect the entire industry's load factor, not to mention the loss of lives, and would have serious financial impact on the carrier involved as well as the industry. Some of the carriers have recognized this responsibility and are making preparations to improve their training programs, purchasing full-flight simulators and other training aids with each new type aircraft."

A Big Job Ahead

The job facing training personnel will not be an easy one. The continuation of the high priest philosophy cannot be tolerated when formulating training programs for these future aircraft.

Direction of the training program and the selection of instructors together with the training aids used will determine how effective the program will be in transmitting essential operating instructions originating with the manufacturer. This process will be an expensive one and if the most is to be gained for each training dollar, then the three essential ingredients: 1. able direction, 2. good instructors, and 3. adequate training aids, will have to be carefully selected.

Millions of dollars are spent each year in the industry for insurance. Good, well presented training to give every pilot adequate knowledge of the aircraft is an insurance policy that pays off every day in efficient and safe operation.

A large item of expense of a training program is the salaries of those sitting in the classroom or on the flight train-

Proper Organization: The Basis Of Good Training

INADEQUATE PROGRAMS RESULT IN . . .

- "High Priest," concept of training results in bare minimum knowledge for working pilot.
- False-economy practices keep down training expenses but allow only marginal training experience.
- Marginal training "specialization," reduces amount of knowledge available to pilot.
- Present calculated risk, play-it-by-ear training philosophy cannot be condoned in jet age.
- Temptation to train certain groups at less expense denies equal qualification for all crew members.

ADEQUATE PROGRAMS REQUIRE . . .

Strong Carrier Programs

- Centralized training facilities for best utilization of instructors, simulators and other training aids.
- Full-time director of training to realize utmost benefits of training programs.
- Director and instructors qualified pilots on all equipment operated by carrier.
- Standardization of all training operations, but with improvements allowable as experience on new equipment develops.
- Standardized periodic checks to prevent deviation from standards.
- No dilution on manufacturer's recommended training course.

Plus Pilot Participation

- ALPA Training Plans Committee on each air line to monitor training standards of their air line.
- ALPA Central Training Plans Committee to collect, compare, and evaluate reports from each air line committee.
- If deficiences are found to exist, ALPA to make efforts to correct them.
- Committees to assist air lines in activating detailed training programs with complete study guide and course outline.

ing schedule. The higher the group's average salary, the more temptation there is to cut down on training and to transfer the knowledge to a lower income bracket group of employees. In most cases the lower income bracket group of employees are most eager to accept the training and the attempted transfer of duties and responsibilities. This is one of the oldest of management maneuvers. Such an economic escape maneuver will be impossible on new aircraft. It is imperative that all crew members be fully qualified if the industry is to survive. ALPA will use every means at its disposal, economically and safetywise, including collective bargaining, to assure the preservation of its members' professional standing through adequate training. Such a statement should be unnecessary in the face of the Civil Air Regulations which charge the carriers with providing this training. However, economics have led to some very peculiar interpretations of the Civil Air Regulations.

Managerial Recognition Essential

All the necessary information to be used in a good training program is eagerly supplied by the aircraft, engine, propeller and component manufacturers. Simulators and other training aids are available from outside vendors or information is available to the carrier to make its own aids. The degree to which these modern training methods are employed will depend on top management's realization that good training pays off.

The formation of turbine powered aircraft training programs has already progressed to an advanced stage on some carriers. These carriers will undoubtedly do the best job of getting the most out of its training dollar. The trend in the industry for economic reasons, is to select a central facility in which to conduct its training.

One well equipped, efficiently run training center is far more desirable than either the traveling road show type of program or the duplication of effort at several bases type of program where standardization would be difficult to maintain and expensive training aids could not be supplied.

"Plans are well under way by some carriers to provide housing for a centralized training program," the committee report reads. "At these centralized installations, facilities will be provided to conduct all phases of training. A once-a-year period of recurrent refresher training is planned consisting of several days during which a pilot will accomplish a six-months proficiency check in the simulator and participate in operational refresher training.

Centralized Training

"This committee recommends centralized training for the following reasons:

- The expense of providing full flight simulators and other costly training aids in each of the several domiciles is prohibitive.
- Supervision, direction and standardization are too difficult with a decentralized program. Sooner or later, one domicile will deviate here and there until there would be little similarity to the original program.
- More efficient scheduling and utilization of training aids can be accomplished in a centralized facility.
- Selection of the site for the central facility could take advantage of:
  - Weather factors.
  - Traffic density.
  - Availability of aircraft.
  - Immediate access to engineering, maintenance and modification data.
- Centralizing record keeping and publications along with the training facility is desirable for efficiency.

Importance of Personnel

"It is recognized that any training program is only as good as the people directing and implementing it.

"Here again, wide variances exist in the industry, from the well-organized program headed by a full-time director who answers to the vice president of operations, to the unorganized programs headed by non-flying personnel as a part-time duty.

"A carrier employing several hundred pilots and operating several types of equipment should have a full-time director of training to realize the most from its training dollar. The director of training fills a very important position. He should be a pilot, qualified on all the equipment operated by the carrier, and should be familiar with the problems of the line pilots. While attempting to provide sufficient training for the line pilot, he must justify the training budget to top management.

"A director of training and his associates should be open to constructive criticism and solicit suggestions from the pilot group through the Individual Air Line Training Plans Committee. It is very easy to lose touch with the line pilots' problems while being burdened with administrative duties. Channels of communication between the pilot group and the training personnel should be an active two-way channel.

Communication Essential

"The director of training should be alert to operational incidents and initiate action to bring these to the attention of all pilots so that similar incidents can be recognized and dealt with safely and efficiently. This dissemination of operational incident information is most important. Not too many years ago much of this kind of information was obtained in the hotel lobby, or, in the crew ready room, or through the grapevine. With many carriers employing hundreds of pilots based in widely spread domiciles, some organized channel of communication must be established:

- Items of immediate concern should be distributed system-wide and called to the attention of the pilot group without delay.
- Items of general informational value, but not requiring immediate action, could be distributed at regular intervals through general publications.
- Changes in operating procedures, Civil Air Regulations and modifications of an aircraft system should be brought to the attention of the line pilot in such a manner that the change will be noted immediately. These changes should be handled separately from other miscellaneous company information so that they will not be overlooked.

An Aid, Not a Check

"Training should be presented to the pilot group as an aid to maintaining their proficiency and the means by which they progress.

"Participating in a good training program is like going to your doctor. It corrects deficiencies to help maintain a high level of proficiency. To resist training is professional suicide.

"Every effort should be made to *eliminate the idea of checking or evaluating* every time a pilot enters a simulator or training aircraft. One training installation advertises by way of signs, prominently displayed, that, *'We are in the training business and proud of it.'*

"There will always be a small number in any group who will resist instruction even though it enhances their earning opportunity. These few individuals should not be allowed to discourage a program that is accepted by the majority of the pilots in the spirit of increasing their professional standards.

"Particular care should be exercised so that the training personnel do not build a great deal of unnecessary detail into the program. Only material that the pilot can use to improve his ability to analyze and react to a known situation should be presented. The criteria to determine the material offered to the pilot should be: *'Does this help him to become a better pilot?'*

(Continued On Page 25)

FLIGHT TRAINING TABLE OF ORGANIZATION

TRAINING: For Full Flight Crew Qualification

Both Ground Training And Flight Training Are Essential To A Complete Carrier Program

By Capt. Steve Gondek
ALPA Training Plans Committee

WHAT is training? What are its purposes?

For the air line pilot, training is an exercise to increase and maintain the pilot's level of proficiency and professional standards; enabling the pilot to perform his duties, assuring a safe, efficient and economical operation. Training corrects deficiencies and provides the pilot the knowledge to make quick, accurate decisions.

For many years, the air carriers have placed the burden of training on the Captain, with the Captain assuming the role of on-the-job instructor. Training of the new pilot was accomplished on the line after a brief training session in the classroom and a minimum amount of flight-time in the aircraft. As traffic increases and the new era of jets approaches us, the pilots realize, and it becomes quite apparent, that "on line training," is outmoded as the need for greater vigilance and safety is required in the cockpit. Too, two fully qualified pilots must be at the controls at all time. Hence, on line training becomes a burden. "Safety," is the primary objective and "training," a necessary operational phase. On line training will always be with us as it is a necessary part of this profession, since experience cannot be taught in the classroom. However, this phase of training can and should be kept to a minimum so as not to burden the Captain with additional duties, which tend to distract him from his work and cause him to lose proficiency in carrying out his most important task of delivering his passengers to their destinations safely. Hence, more training will have to be done at the respective air carriers' training centers.

The New Pilot

Each air carrier has its own prerequisities for the new hire. With this comes the responsibility of the pilot group to monitor the new pilot as he completes his training, and before he enters the cockpit, to assure the public that the crew complement is fully trained, capable and rated for a safe operation.

Increasing Licensing Requirements

The Air Line Pilots Association, through action of the Board of Directors in 1957 after several years of study has proposed to the CAB an

amendment of the Civil Air Regulations. This amendment calls for an Air Line Transport Copilot License. Since World War II, the air carriers have experienced several Captains being incapacitated in flight. In each of these instances, disaster was averted due to having qualified pilots on board who had been with the carrier for several years and at one time may have been Captains on other equipment. How many pilots have experienced an emergency in flight or autofeathering on take-off? How much help was your copilot? Did he say: "This is the first emergency procedure I've been through since my training"—experience which could have been anywhere from one to three years ago. The copilot may fly on the air lines as a copilot for many years and except for minimum equipment transition, receive little or no training or opportunity for maintaining proficiency with the exception of Link. The Air Line Transport Copilot License will correct this deficiency as the copilot will be required to receive periodic checks at the same time intervals as the Captain, thus assuring rated, capable and qualified crews.

The committee in its report pointed out:

"It is not the intent of this committee to dictate any of the air carriers' prerequisites for the new hire. However, it is the responsibility of the pilot group and the company to monitor the new pilot as he completes his training and before he enters the cockpit, to assure the public that the crew complement is fully trained, capable, and rated for a safe operation.

Association Policy

"In drafting these general training recommendations, the committee included the requirements for an Air Line Transport Copilot License as proposed by the following resolution passed by the ALPA 14th Covention in 1956:

WHEREAS the training and experience requirements for pilots licensed to serve as copilot in scheduled air transportation have lagged behind the technological development of aircraft and increased complexity of procedures necessary to their operation, and

WHEREAS such lag in licensing requirements for copilots has resulted in a lower level of safety for the operation of scheduled air line aircraft and imposed additional burdens on the pilot-in-command who must serve as both pilot of the aircraft and training pilots, and

WHEREAS the complexity of operation of modern aircraft under the increased requirements of navigation, communications, air traffic control, increased speeds, etc., make it mandatory that fully qualified pilots be available at all times for safe operation, and

WHEREAS the theory of aircraft operation makes it mandatory that a pilot serving

A Career-Long Concept Of Full Crew Training

1 ADEQUATE LICENSE REQUIREMENTS

- ***Establishment of an Air Line Transport Rating for copilots.***
- ***Provide for type rating on equipment for copilot.***
- ***Establishment of new minimum experience requirements for copilots.***

2 INITIAL AND COPILOT TRAINING

Objectives	Method
• Reduce "on line training," to relieve burden on Captain and provide two qualified pilots at the controls at all times.	• Review of a pilot's progress every 90 days by a probationary board which would include one ALPA member.
• Increase training at carrier's respective training centers instead of "on-the-job."	• Comprehensive ground school, flight and simulator training with flight checks every three months.
• Provide new pilots who will meet standards established by pilots to assure fully trained, rated and capable for safe operation of aircraft.	• Placement of copilot recurrent training on same level as that of Captain's.
	• Ground school training for third pilot the same as that for copilot.

3 UPGRADING, RECURRENT TRAINING

- ***Six months notification of scheduled upgrading.***
- ***Command course in ground school.***
- ***Upgrading training after completion of three years of service and accumulating 1,500 hours with the air line.***
- ***Better utilization of recurrent training period to demonstrate pilot's knowledge of systems and performance rather than as an instrument check.***
- ***Yearly refresher training at a centralized facility.***

as copilot be fully qualified to bring the aircraft safely to destination in the event of the incapacity of the pilot-in-command,

THEREFORE BE IT RESOLVED that the Association immediately initiate action with the Civil Aeronautics Board to increase the experience and licensing requirements for pilots to serve as copilot in scheduled air transportation, and

BE IT FURTHER RESOLVED that one of these requirements shall be that all copilots shall, before serving as copilot, have a type rating on the aircraft on which they are to serve as copilot, and

BE IT FURTHER RESOLVED that a specific proposal to be submitted to the Civil Aeronautics Board will be formulated at the earliest possible date by the Executive Committee and will be submitted to the ALPA Board of Directors for their consideration and approval prior to such submission."

"The Executive Committee has studied this subject at length and at a meeting April 22-24, 1957, adopted the following resolution for transmittal to the Board of Directors as their recommendation required by the resolution of the 14th Convention:

WHEREAS present regulations of the Civil Aeronautics Board permit an individual to serve as an air line transport copilot without such pilot having the experience, training or competency to operate the aircraft in the event of the incapacity of the pilot-in-command, and

WHEREAS such regulations permit an individual to be utilized as a copilot who has neither the experience, training, nor qualifications to assist the pilot-in-command in the operation of the aircraft under routine or emergency conditions, and

WHEREAS present regulations permit a pilot with the minimum qualifications of a commercial license and instrument rating to be assigned to fulfill the copilot functions and thereby the pilot in command may be handicapped in the performance of his duties and responsibilities and actually serves as a training officer while conducting flights with passengers in scheduled transportation, and

WHEREAS the foregoing regulations do not require the maintenance of the level of safety in air transportation expected by the traveling public,

THEREFORE BE IT RESOLVED that the Air Line Pilots Association immediately petition the Civil Aeronautics Board to revise present regulations or promulgate new regulations to accomplish the following:

1. To create a new Airman Certificate to be designated as an Air Line Transport Copilot License.

2. (a) That the minimum experience requirements for an individual to qualify for examination for such Airman's Certificate shall be at least 1,000 hours' experience of dual and solo flying as a pilot if acquired in aircraft of less than 12,500 pounds, or at least 750 hours of dual and solo flying experience if 500 of such hours are acquired as pilot in aircraft in excess of 12,500 pounds.

(b) To satisfy the provisions of the above paragraph, an airman possessing a commercial pilot's license and an instrument rating and serving in a flight crew member capacity other than first or second in command may log not to exceed 50 per cent of this flight time toward the minimum 1,000 hour requirement for the Air Line Transport Copilot Rating.

3. That an individual serving as second in command on an air line transport aircraft shall possess a current type rating on the aircraft on which he is serving and must undergo periodic proficiency checks to maintain such rating on a current basis.

Submitted to CAB

"This recommendation has been approved by the ALPA Board of Directors and has been submitted to the Civil Aeronautics Board for regulation.

"This ALPA proposal is substantiated by the Civil Aeronautics Board findings of at least 31 cases where inadequate training for copilots contributed to accidents in the five-year period 1951-1956.

"Also directing the course of the committee's recommendation is the following resolution of the Turbo-Prop and Jet Transport Study Committee as adopted by the ALPA 14th Convention:

RESOLVED that it shall be the policy of the Air Line Pilots Association that all members of the operating crew shall be pilot qualified, and

BE IT FURTHER RESOLVED that it shall not be inconsistent with the implementation of this policy for the Association to provide job protection for currently employed non-pilot operating crew members, and

BE IT FURTHER RESOLVED that the Board of Directors at the 14th Convention adopt as mandatory ALPA Policy, that no Turbo-Prop or Jet Turbine powered aircraft will be operated unless and until it is manned at all the flight stations by a qualified pilot in the employ of the company as a pilot, and

BE IT FURTHER RESOLVED that the third crew member requirement, in present and future aircraft be continued, and

BE IT FURTHER RESOLVED that crew members shall be known as Captain, First Officer, Second Officer, Third Officer, Fourth Officer, etc., and under no circumstances will such pilots be referred to as Flight Engineer, Navigator, Radio Operator, etc., and every effort shall be made to encourage standard usage of these recommended titles, and

BE IT FURTHER RESOLVED that ALPA will resist the removal of any crew member from the operating crew, unless the pilots involved concur with such removal. The pilots involved will not give their approval for such removal without first considering two things:

1. Can the trip be safely operated after the removal of the crew member?

2. Are the pilots willing to accept the additional workload?"

The Third Crew Member

At the present time, some air carriers are using the third crew member's position to a great advantage by having pilots at this position. Other air carriers are filling this position with specialized engineers, who are not pilots.

The source of trained pilots has diminished to the extent that the air carriers have had to submit to hiring pilots with minimum requirements and experience. Also, today's military trained pilots are being hired with little or no experience in piston-driven aircraft since they have been indoctrinated in the jet field. It is realized that the piston-driven equipment will be with the industry for a good many years, so that this jet experience will not be of value to the carriers or pilot at this time.

Since all new hired pilots will be operating piston-driven equipment, the third crew member's position is an excellent place for this pilot to begin his air line career. Here he will obtain his mechanical training as well as his pilot training. Operational needs will dictate the time he will be trained as a First Officer and then a Captain. Once a Captain, we have a pilot trained at all the stations on the flight deck, having all the qualifications to better handle any situation which may arise. We have another important function being carried on while this new hire is progressing through the stages until he reaches his ultimate goal of becoming a Captain. This function is very important to the air carriers as well as the pilots and that is obtaining "Command Ability."

To my knowledge, there is not one air carrier giving a course on "Command Ability," to its pilots. Therefore, the pilot must obtain this ability from observation by flying with a Captain and hope that what rubs off on him is the best and correct direction for him to follow upon his checkout to Captain.

In using a pilot at the third crew member's position, we have a person well versed in subjects pertaining to aviation as well as aviation language. This alleviates the problem of the Captain taking the time to explain what he desires, as he does to a specialized engineer. With three pilots on the flight deck the "division of duties," concept is replaced with positive "co-ordination of duties," and this brings on the "Fail Safe," principle.

Initial Training

The initial training phase is of utmost importance. It is here that the company gets a good look at the new pilot. Here he will display his knowledge of the various subjects pertaining to aviation; how he adapts himself to classroom discussion, his punctuality in attending classes, how he gets along with his classmates, and how well he absorbs the study material presented. From the above, the company can determine readily whether he is the calibre air line pilot desired.

The pilot should be given a compre-

hensive course on subjects preparing him for his Copilot ATR written exam. In addition, he will have courses concerning the individual carrier's operation.

Since the industry has suffered several aircraft accidents in the past year, particularly accidents caused by basic laws of physics being violated, the pilot should be given a course on basic physics and basic engineering. This will give the pilot enough background information to know why the airplane and its component systems will react in a certain way under certain conditions.

After the completion of his ground school, the pilot should be assigned several rides in the "jump seat." By observation, he becomes familiar with the carrier's operation, routes, First Officer duties, and cockpit procedures. During this period, the observer pilot should duplicate the duties of the First Officer (keeping flight plan, flight log, copying clearances, etc.). These forms become a part of his record. The pilot should not be released for further flight training until such time as he has satisfactorily completed this portion of his training.

All new pilots, regardless of previous experience, should receive an equal amount of ground school training. In addition, all pilots should be given a course on the airplane and its components as required by CAR to enable him to obtain his third crew member's rating.

Use of Simulators

Actual flight time in the aircraft will depend largely on the individual and whether a carrier uses simulators. In using simulators, cockpit familiarization, emergency procedures, systems operation and optimum performance can be demonstrated over and over until such time as the pilot becomes proficient. Here again, "observer time," in the simulator will prove very valuable to the trainee. Carriers not using simulators will have to give more time in the aircraft. However, the pilot shall be brought up to maximum proficiency to enable him to complete successfully his Copilot ATR flight check.

Newly hired pilots with insufficient flight time to qualify for the Copilot ATR should receive the same ground and flight training as the Copilot ATR flight check.

Probationary Period

The probationary period of a new pilot is of great concern and value not only to the carriers, but also to the pilot group. During this period, the carriers and pilot group obtain a clear picture of the individual as to his piloting abilities and at the same time measuring his conduct as to professional standards of the industry. It is needless to say that a mutual problem exists here. Therefore, each air carrier should have a probationary board consisting of at least one ALPA member.

In this respect, the committee reported:

"This board will become an automatic monitor of the entire training picture, checking not only the probationary pilot, but also, the training staff. Training can only reach its true value through programs presented to the student by competent instructors. To help the board in evaluating the pilot, monthly reports shall be submitted by the Captains to the Chief Pilot. These reports shall be brief so as not to become a burden upon the Captain and discourage him from submitting them. Though brief, this report should be objective and positive so that a true picture of the new pilot can be obtained as to his progress, proficiency, and professional ability.

"This board shall meet every 90 days to review the progress of the student. During the 12th month the board shall notify the pilot whether or not he is acceptable.

Necessity for Enforcement

"There are several reasons why a concentration of probationary training should be enforced.

- As a probationary pilot, he will be more receptive to training.
- Training done at this time while the pilot is at the lower end of the pay scale, will be more economical for the carrier.
- Since these pilots will be the future Captains of the air line, starting with a good comprehensive course of instruction and study will enable them to maintain through the years a higher degree of professional standards.

The following requirements should apply:

- **Ground School:** This probationary training shall consist of:
  - Periodic exams on equipment, routes, CAR's, company regulations.
  - Emergency equipment and procedures.
  - Link training.
- **Flight Training:** Consisting of:
  - Line check every three months.
  - Six-month checks. One at the end of the sixth month and another before the end of the twelfth month.
  - Simulator training when available."

Copilot Recurrent Training

Carriers using simulators are doing a good job in the area of copilot recurrent training. However, most carriers are still using the initial check-out and then turning the pilot over to the Captain for "on-the-job training." Copilot recurrent training should be placed on the same level of importance as that of the Captain. Once a year the copilot should receive a good refresher ground school course consisting of equipment familiarization, review of CAR's, company regulations, CAR T category performance, emergency procedures and manual publications and revisions.

Flight training every six months for copilot proficiency checks would include:

- Flight with T category performance.
- Simulator if available, Link if not available.
- Third pilot ground school same as copilot. Flight (a) every 3 months to maintain pilot qualification; (b) every 6 months, flight period of not less than 2 hours.

Copilot Transition

Copilot transition has been one of the weakest areas in most carriers' programs. In many instances the training dwindles down to three take-offs and three landings with emergency procedures being omitted and again, the pilot turned over to the Captain for on line training.

By adhering to the Copilot ATR requirements and the three equally trained pilot operating crew member concept all pilots transitioning should receive the same curriculum. The third crew member pilot may omit the ATR Flight check.

The committee's recommendation on this phase is:

- **Ground School:** Equipment—time spent will vary according to aircraft; however, there should not be wide variances between the several carriers' programs on the same model aircraft. The ALPA Training Plans Committee monitoring machinery and evaluation process will function to maintain a minimum as desired by the pilot group.
- **Flight Training:** Requirements as specified for Copilot Air Transport Rating. If the pilot will be acting as third crew member, the ATR check may be omitted.
- **Observer Line Training:** Pilot should make several round trip flights as an extra crew member, observing the operations, cockpit procedures and obtaining cockpit familiarization. The Captain in command of the flight on which this observer training is taken, will sign a form to substantiate the completion of this phase of training.

(Continued On Page 24)

TRAINING:

For Transition To Turbine Aircraft

By Capt. Don Leonard

ALPA Training Plans Committee

PROBABLY the greatest motivating force behind the establishment of the Training Plans Committee was the advent of the operation of the turbo-prop and jet aircraft. All pilots and the aviation industry realized this would be a big transition and hoped to accomplish it in a smooth competent manner.

The ALPA Pilot Training Plans Committee gave this part of its study a high priority, but it was emphasized to us that this transition will be routine progression. Although some new concepts will be encountered and introduced, there will be no need for a departure from presently available transition machinery. These transitions have already been accomplished in both the industry and military without resulting in any unusual changes in present training machinery. In order to make this change smoother and to alleviate any anxieties, the committee, however, has recommended that each air carrier begin well in advance of

delivery of their jet type airplanes, to prepare the pilot group by making available to them some of the comprehensive study material in the possible problem areas. Such subjects are: turbine engines, basic and swept wing aerodynamics, high altitude indoctrination, high altitude meteorology, electronics, and pneumatics.

These are not necessarily new areas but by understanding some of the new concepts and adaptation to them will simplify the performance problems. The economic value of these new aircraft will depend very much on the pilots and their knowledge and understanding of their performance capabilities. The flight crew must function as a team, understanding and assisting each other. Due to this and our "Fail Safe" crew concept, we should insist that all three pilots in the crew receive equal ground school training.

Complete Familiarity Necessary

To follow this concept through flight training, the Captain, in order to properly direct his crew in all normal and emergency procedures, should be familiar with these duties as performed at all three stations. All pilots should have some actual operating experience at the third pilot station.

Our committee reported:

"It has been indicated that the flight curriculum will be about the same as comparable present-day aircraft. The committee believes that, due to the fewer number of controls, switches and instruments, flight transitioning into turbo-prop and jet aircraft will be less complex than previous aircraft introductions. At this time, the committee is of the opinion that transition into these aircraft can be accomplished with 15 hours in the aircraft flight simulator and 5 hours in the aircraft. The figure of 5 hours flight time is based on the condition that the time is given in short periods of about one hour duration and interspersed over several days. The pilot can learn performance characteristics of a system in the classroom. Then, apply its operation thoroughly in a simulator and conclude with an aircraft flight session to tie his new knowledge of flying skill.

"It is recognized that the actual flying of these aircraft is simpler, however, to achieve maximum quality, it will be necessary that the pilot understand the performance data and be more familiar with the system operation than heretofore."

High-Altitude Indoctrination

On high-altitude indoctrination the committee found: "Up to the present time, organized, high-altitude indoctri-

Transition Training To Turbo Prop And Jet Aircraft

REQUIREMENTS

THESE NEEDS . . .

- Training of crews in advance of arrival of aircraft from manufacturers.
- Study of turbine engine, basic and swept wing aerodynamics, electronics, high altitude indoctrination, high altitude meteorology, and pneumatics.
- Flight crews' ability to function as a team, understanding and assisting each other.
- Same ground school training for all three pilots of crew.
- Captain's familiarity at all three stations and all crew member's experience at the third station.

METHODS

ATTAINED IN THIS MANNER . . .

- Full simulator training comparable to USAF facilities.
- Careful selection of instructors.
- Training in normal operations and procedures of jets.
- Training in emergency procedures.
- Training in instrument procedures.

OBJECTIVES

ACHIEVE THESE RESULTS . . .

- Coordination of cockpit crew duties rather than division of duties.
- Removal of a line of demarcation on crew functions, which cannot be tolerated in the interests of safety in the operation of jets.
- Flight crews able to work together rapidly, or at any position in adverse weather conditions or in high density areas.
- Each crew member able to double-check and monitor all duties and provide "fail safe," operation of the aircraft.

nation training has not been considered necessary for the air line pilot, although he is flying regularly at altitudes up to 25,000 feet. Today's aircraft design has, in most cases, been adequate to withstand working differentials with acceptable cabin altitudes while the aircraft is maintaining altitudes of 16,000 to 25,000 feet.

"Very few instances of rapid decompression have been experienced by air carrier crews and no incidents of complete incapacitation due to anoxia are known to the committee at this time.

"However, rapid decompression, even in present aircraft, creates an extremely serious emergency. In turbo-prop and turbo-jet aircraft operating at higher altitudes and meeting more critical operating criteria in general, any rapid or explosive decompression will be potentially catastrophic. That these aircraft will be carrying up to 150 to 200 passengers emphasizes the gravity of the problem. This problem has been met by the ultimate in engineering to prevent its occurrence. Intensive training and study shall be given to best enable the pilots to adequately handle the emergency if it does take place.

Equal Training Flow

"This can best be accomplished by ensuring that training in flight operation of these aircraft flows on an equal basis through the pilot group. Thus, even though the actual piloting experience level could range from a 25 or 30 year first pilot down to second and third pilots of 5 to 10 years experience, each of these pilots will have sufficient specific knowledge and training to act as a backstop for each other in any situation and thereby provide to the greatest possible degree a 'Fail Safe,' cockpit team.

"The concern of many people in the air transport industry for high altitude training is generated by the performance figures for future turbo-prop and jet transport aircraft. It is expected these aircraft will push the normal cruising altitude to 35,000 or 40,000 feet. Pressure differentials working on the aircraft cabin will double. The combination of simultaneously doubling cruising altitude, doubling cabin pressure differentials, and introducing a new airframe to these conditions gives weight to this concern.

"Simply put, it is a matter of pressure. At 18,000 feet the atmospheric pressure is about one-half that at sea level. As we move on up to 27,000 feet, the pressure is one-third sea level. At 33,400 feet, it is only one-fourth, and at 38,500 feet only one-fifth the sea level pressure. The problem of pushing up beyond today's normal cruising altitudes toward 35,000 or 40,000 feet would be greatly minimized if we could be positive that the doors and windows in these new aircraft will not blow out, and will have pressurization systems which will not fail.

"However, practical problems being what they are in this type of air carrier operation, a possible failure bringing about rapid decompression will probably always have to be considered. Several years of actual operation will be necessary to reach a sound conclusion with respect to this factor.

"In a series of jet bomber rapid decompressions occurring at from 26,000 to 39,000 feet, at least one crew member became unconscious in each incident in spite of having his mask at the side of his face and having undergone training in decompression procedures. In each of these instances, at least one pilot was on oxygen at the time of decompression and successfully managed a descent.

Special Training

"It is apparent that some special training will be necessary for the air line pilot who will be cruising at 35,000-40,000 feet. The question is, how much training?

"It would seem that the minimum amount of training which an air line pilot should receive would be a curriculum including several good motion picture films showing the effects of hypoxia, anoxia, and the confusion, noise and demoralization which results from rapid decompression. Films on the subjects are available from the Military, the CAA, and some manufacturers. There are also a number of good publications on the subject.

"Because of the risk involved, no air line pilot should be subjected to rapid decompression in a high altitude chamber. During World War II at least 150 cases of serious collapse and at least 7 deaths were recorded during chamber training. Although the seven deaths were a minute percentage of more than one million exposures, the risk is still there. Chamber training should be confined to demonstrations of hypoxia and then only on a voluntary basis. If a Military chamber installation is conveniently located in the same area in which an air line conducts its centralized training, arrangements could be made to run volunteers through and have others witness from outside the chamber. These tests should be conducted under rigidly controlled conditions and supervised by a medical doctor.

"In addition to motion picture film indoctrination, the pilot should have thorough knowledge of the oxygen system installed in his aircraft so that there can be no misunderstanding as to its normal and emergency use and limitations.

Oxygen Consciousness

"Air line pilots will have to become more oxygen conscious than heretofore.

"The committee recommends, for maximum safety, that one pilot wear a mask at all times when the aircraft is operating above 25,000 feet at least until some years of practical operation experience is gained with the new aircraft. Improvements in oxygen masks must be developed to make this requirement acceptable from the standpoint of comfort and practicability. **Personally** fitted, comfortable oxygen masks must be furnished.

"More than a casual demonstration of the emergency descent will be necessary. A maximum performance type descent will be required to save passengers and crew members' lives should a rapid decompression take place at 30,000-40,000 feet. Use of approved and tested procedures to descend from high cruising altitudes, in a minimum of time for the particular aircraft involved, will have to be stressed.

"As information becomes available, indoctrination on jet stream flying will be necessary. Clear air turbulence associated with jet stream wind shears will have to be given consideration. Possible means of detecting wind shears in advance by small temperature changes or other means should be explored."

Full-Flight Simulator

A definition is needed to differentiate between the full flight simulator and the various other training devices which have all been grouped as simulators. A full flight simulator is an exact duplicate of an aircraft cockpit which accurately simulates the physical and flight characteristics of a specific type and model. Such a simulator is capable of presenting to the pilots full navigation information and flight instrumentation, plus engine operation performance, normal and emergency system operation.

The complete flight simulator, as described above, should be the only type to be considered as adequate, when use is made of a simulator under CAR 40.302. Other devices, such as cockpit familiarization trainers, duplicators, procedural trainers, etc., which do not present full navigational or flight attitude information, do not qualify for use under CAR 40.302.

The U. S. Air Force has led the way

in the development and use of the flight simulators. Many hours of research and actual operating experience have given the Air Force an extensive picture of the value and limitation of the full flight simulator.

Some commercial carriers, also, have several years' experience in the use of this training aid. Many more simulators are on order for turbo-prop and jet aircraft, stimulated by CAR 40.302 which permits their use for a six-month proficiency check.

The Values of Full Flight Simulators are:

▶ Offers a high degree of realism in presenting to the pilot normal operations and procedures in the cockpit environment without outside distractions.

▶ Permits instructor to observe performance without maintaining a vigilance outside the cockpit for other aircraft. Maneuver may be stopped and discussion may take place at any time.

▶ Emergency procedures too dangerous to be practiced in the aircraft can be safely practiced in the simulator.

▶ Permits more effective utilization of pilot's training time through elimination of turn-around and servicing time or time lost because of weather.

▶ Lower operating cost of trainer versus aircraft operating cost.

▶ High utilization of trainer.

▶ Elimination of wear and tear and risk to aircraft used for training.

The Limitations of Simulators:

▶ While some of the new turbo-prop and jet simulators will have motion around the pitch and lateral axes and offer pictorial display through the use of the television cameras, there will never be a simulator which will completely reproduce all of the flight sensations and characteristics of the aircraft. Therefore, the simulator should supplement, not replace, the aircraft in training.

DC-8 SIMULATOR: Simulators Have Both Advantages, Disadvantages

▶ With the known limitations of the simulator, it should never be used as an evaluator in place of an aircraft, except when used under CAR 40.302.

▶ Today's simulator is a very sensitive and complicated electronic device. A simulator maintenance man must not only be an electronics specialist, but must also have a working knowledge of aerodynamics, engines, and propellers, as well as being able to fly the simulator to determine if the device is functioning properly. Air conditioned, dust free housing is necessary for the device if maintenance is going to be held to a minimum.

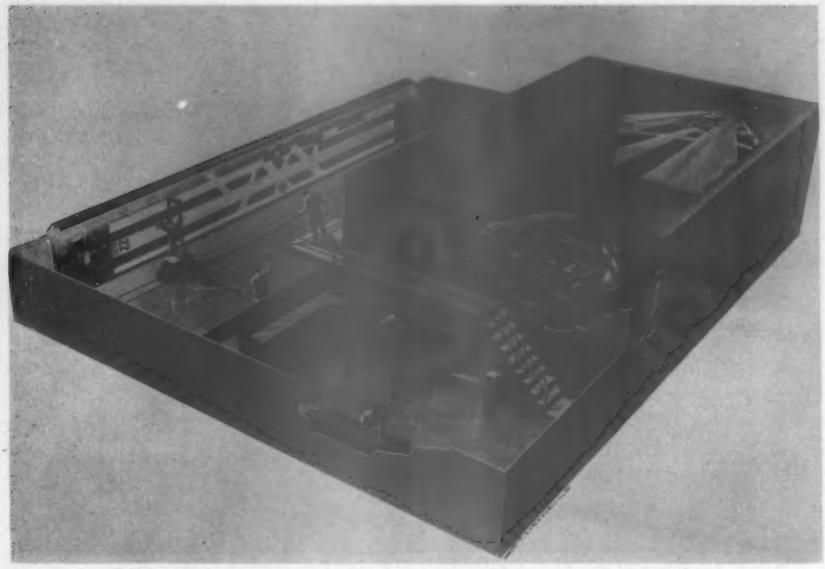
▶ Because of the considerations set forth in paragraph No. 3 above, the use of simulator should be restricted to training and practice only, with no grading system used or record of quality of performance kept on the student. Only a record of time spent and maneuvers completed in the simulator should be necessary.

▶ When first introduced into a program, the simulator will have to be sold to a pilot group. Careful selection of instructors will be necessary. Most air line pilots using simulators now and in the future will be highly experienced men who will not take too kindly to an instruction policy which consists of injecting one emergency upon another, until a pilot's breaking point is reached. The success of the simulator in a carrier's training program will depend upon the instructors and the curriculum followed. Any pilot can be saturated with emergencies to the point of complete confusion. This is not the intended use of this device.

707 SIMULATOR: For Proficiency Maintenance, Not Evaluation

ALPA Policy On Simulators

High initial investment and hourly operating cost of today's and tomorrow's aircraft will make more wide-



TELERAMA SYSTEM: Adds Visual Element To Simulators

spread use of flight simulators. The Air Line Pilots Association has accepted the flight simulator with its limitations and has adopted the following policy:

▸ That the device so mentioned and the Association training curricula shall be used only as a training aid.

▸ That the training program itself shall not include any type of grading system of the use of unrealistic emergency situations.

▸ That the training program shall be used as a means of developing pilot technique.

Use Of Simulators

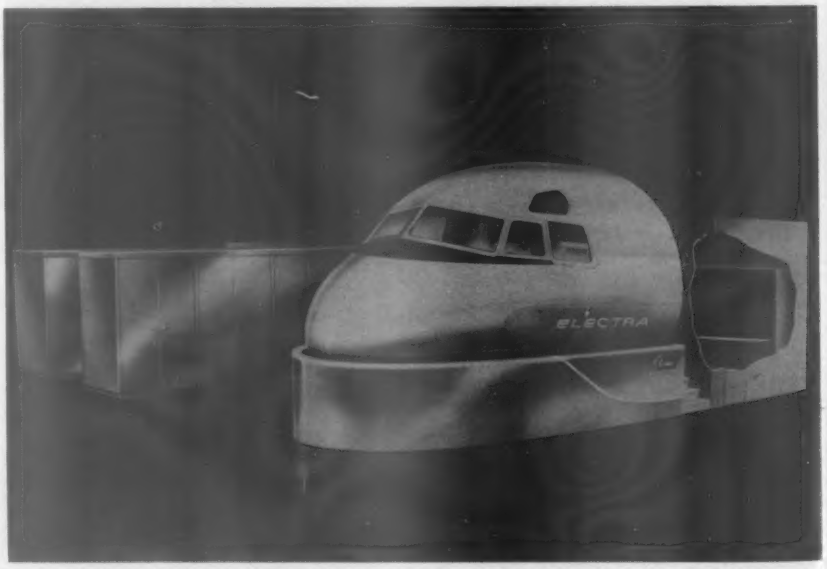
"The following general outline of the use of simulators is recommended after the committee's review of many programs:

▸ **Training in normal operations and procedures:** Certainly, normal operation of an aircraft should be understood by the pilot before emergency situations are presented. Desired normal procedures and coordination of duties, plus cockpit familiarization, should be the first use made of the simulator. Practice of normal operating procedures, as used in the aircraft, will develop the pilot's skill and speeds in locating, recognizing, interpreting, responding, controlling and cross checking controls, instruments, gauges, switches, valves, and lights, which are essential to the operation of the aircraft. Explanation should be made of why certain procedures are used and what would be the result if deviation is made from these procedures. T-Category performance of the aircraft in different gear and flap configuration should be stressed.

▸ **Training in emergency procedures:** Simulators can be used to great advantage to improve crew coordination and ability to detect, diagnose and cope with emergencies. Practice in emergency procedures will enhance the pilot's ability to judge the emergency quickly and accurately and initiate corrective action. Actual corrective or combative procedures can be positively executed in comparison to negatively just touching the proper control.

▸ **Instrument procedures:** Instrument procedures peculiar to the particular aircraft the simulator is duplicating should be practiced in this device. Other instrument trainers, such as the Link Trainer or the Dehmel Duplicator, can be used to supplement the simulator.

▸ **Crew coordination:** Adequate and positive coordination of duties under normal and emergency conditions can be worked out in the simulator. The committee feels very strongly that the philosophy of operating these aircraft, to be successful, is going to have to be developed around 'coordination of duties,' rather than upon 'division of duties.' The 'division of duties,' concept establishes a line of demarcation between crew functions tending to encourage crew members to move in their own sphere of activity without being adequately interested or trained with respect to the relationship and effect of their duties upon the overall safety and efficiency of operating the aircraft. The 'division of duties,' concept has become increasingly unsatisfactory on present transport aircraft due to increased operating problems and pressures. The more critical requirements of jet operation must inevitably make this concept outmoded. Because of the foregoing, the ALPA Turbo-Prop and Jet Study and Technical Evaluation Committees unanimously recommended that turbo-prop and jet aircraft not be flown except with a 3-pilot flight crew on those aircraft requiring a 3rd crew member. This was subsequently adopted as ALPA policy. It becomes evident that crew coordination, as such, for routine as well as emergency operation,



ELECTRA SIMULATOR: Simulators Can Aid In Coordinating Duties

must become a part of proper preparation for flight operation of turboprop and jet aircraft. This training, for example, should duplicate the multiplicity of duties developing upon a flight crew entering a high density traffic area such as Chicago or New York during adverse weather conditions. Time and motion studies should be made under such simulated situations to determine how best to monitor the radar, stay ahead on the charts, change the radios, handle the two-way communications, fly the airplane, and monitor the engine and systems instruments and indications with speed, precision, and efficiency to meet the increased speed and operating problems of this type aircraft. This training should be sufficient so that each crew member can function adequately in at least two and preferably all three positions. For example, the Captain and first officer should each be capable of adequate proficiency in all three flight stations; the third pilot should, at the very least, be adequately trained and qualified to perform his duties and those of the first officer as well. The training and coordination of these functions should be thorough enough to insure a high degree of proficiency and flexibility for emergency conditions, and, in addition, provide a sufficient overlap during routine operation to provide for double-check monitoring of all duties performed. The concentration of large amounts of training of a specialized nature in one crew member at the expense of adequate specialized, or, even general training, in the other crew members will result in a defeat of the best interests of safe operation and the 'Fail Safe' principle.

▸ **Evaluation of procedures or instrumentation:** If a change in operating procedures or instrumentation is planned, the mechanics can be evaluated in the simulator before being applied to line operation. Such simulator evaluation can be done at a much lower cost than in the aircraft.

▸ **Determination of accident cause:** Reconstruction in the simulator of the events leading up to an accident may reveal difficult or confusing procedures or environment which could have been the contributing cause.

▸ **Briefing:** A complete briefing should take place before entering the simulator. Each crew member should be aware of what is to be accomplished and the part he is to play in accomplishing it. A maneuver sheet for each period's work should be available to the pilots in advance of this training.

▸ **Critique:** After each simulator period.

A free discussion of the difficulties encountered during the period should take place without reflection on any pilot's ability. Difficulties are to be expected, which is the reason all the money, time, and effort are put into training. The simulator exists only to detect and correct deficiencies on an objective basis. Each student's evaluation of the simulator program should be solicited. Flaws in the program which are not apparent to the instructors can be corrected by this means.

In order to fully realize the value of a simulator and use it under CAR 40.302, it must be maintained by CAA regulation to the same rigid standards of the actual aircraft it simulates."

Training Aids

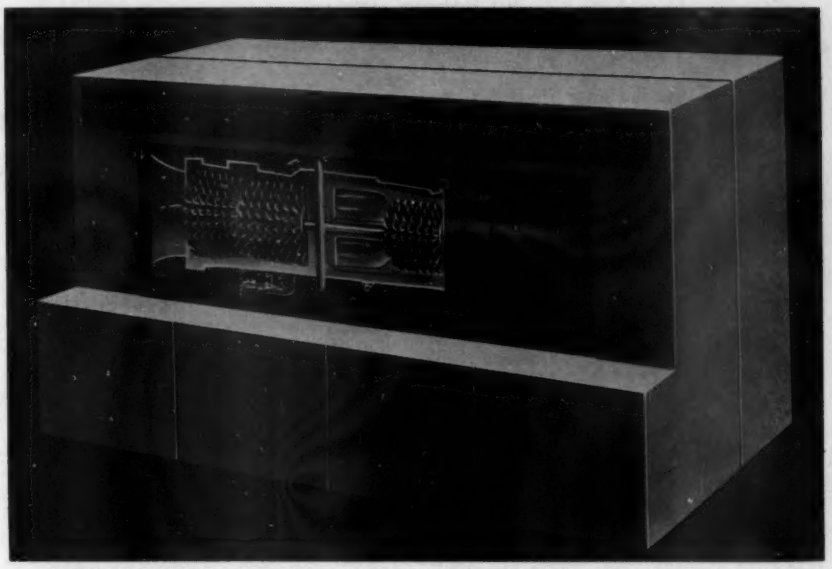
On training aids, the committee found:

"Training aids are the instructors' tools and the company's time and money savers. They cost money. So their use has to be evaluated and justified.

"Training aids can be a simple schematic drawing of a system, or, a full cockpit simulator. Since the use of the simulator is covered elsewhere in this report, training aids, as referred to here, will be understood as those visual aids used for ground school instruction.

"The advantage of using good training aids is well established in the Military training programs. During World War II, many men who had never been in an aircraft were trained on complicated aircraft systems in a minimum of time with the extensive use of full scale working mock-ups, motion pictures, etc.

"Since the cost in air carrier operations is a major governing factor, it is obvious that an air line training program will not be as elaborately equipped as a Military training program. With the new turbo-prop and jet equipment due to arrive on the scene, the maintenance people will also have to be trained along with the flight crew. The cost of ground training aids for this equipment can be justified by use with both ground maintenance and flight training. It is also apparent that the larger the carrier, the more people there will be to train and the more justification there will be for training aids.



ENGINE MODEL: Visual Training Aids Are An Important Training Tool

Advantages of the use of good visual training aids:

▸ Aids instructor by reinforcing the spoken word with visual presentation.

▸ Aids student by utilizing two senses, the ears and the eyes, to understand material being presented.

▸ Complicated mechanical devices and systems are difficult to present and understand by the spoken word alone. The one dimension picture, or schematic, is only a minor aid to the spoken word. The three dimension working model or mock-up would replace all but the minimum amount of spoken words, thereby saving the instructor's time and the student's time.

▸ Pilots learn by observing, listening, and actually manipulating the controls or systems and observing their effect.

(Continued On Page 29)

THE THIRD CREW MEMBER

Failure To Solve This Problem Will Jeopardize Safety, Hamper Proper Crew Requirements

By Robert Tuxbury
Secretary, ALPA

THE ALPA Training Program recently approved by the Board of Directors as an Association policy goal, contemplates an even level of knowledge and skills among cockpit crew members, and a more equitable distribution of training so no crew member is excluded.

Its purpose is to produce fully-qualified crews. However, it is not a one-way street. It means reposing in the pilot systems knowledge and skills and the training necessary to retain proficiency in them. It also means reposing in the third crew member flying skills and the training necessary to maintain them. In short, it means advancement of qualifications in all three seats.

Inevitably, because the third crew member is involved, the question of jurisdictional aspects arise frequently and are often presented in anything but their proper perspective. The background concerning this should be clarified.

ALPA Charter Granted in '30

Since 1930, the Air Line Pilots Association has been representing flight crew members under the provisions of the Railway Labor Act. This has included not only pilots but other classes and crafts, such as flight engineers, navigators, stewards, stewardesses, etc.

The flight engineer ranks were greatly increased in 1948, due to the Civil Aeronautics Board requiring a third flight crew member on all aircraft certificated for over 80,000 pounds. The pilots who have served in this capacity have been members of the Air Line Pilots Association; however, it should be emphasized that regardless of the qualifications of those individuals serving in the third flight crew member capacity, they are all performing duties previously done by pilots and the same work that is now being done only by pilots on aircraft weighing less than 80,000 pounds.

There is a great deal of controversy as to just how two unions ever got into our modern cockpit. There is no question but what the Air Line Pilots Association must accept some of the blame for permitting this to happen, but it will in no way help solve the problem that we are now faced with by blaming individuals or groups for the untenable position in which we now find ourselves.

FEIA Charter Granted in '48

In 1948 the Executive Council of the American Federation of Labor granted a charter to an organization known as the Flight Engineers International Association. This was done after, and in spite of the fact, that the Air Line Pilots Association had been representing flight crew members for more than eighteen years and, was even then representing a number of flight crew members performing as a third crew member or flight engineer on board air line aircraft. This charter was granted without a hearing being afforded representatives of the Air Line Pilots Association, or as far as we can determine any real effort to determine the impact of such an action. This action was most vigorously protested in a letter to William Green, then president of the American Federation of Labor, on May 18, 1949, by Mr. David L. Behncke, then president of ALPA.

By this action, the Association has long held, the Executive Council of the AFL condoned the creation, within the jurisdiction of ALPA, of a separate organization of flight crew members and created an impossible representation and technical situation which has not yet been resolved. Many conferences have been held between representatives of the FEIA and ALPA in an effort to resolve the many problems which arose as a result of this action by the A. F. of L. Some of these conferences were attended by officials of the A. F. of L. The conferences have for the most part been fruitless and the problems have remained unresolved. In fact, the problems have become more difficult with the years. The impracticability of dividing flight crew members into separate unions has been repeatedly demonstrated. In some situations, an intolerable problem has been created in the cockpit.

ALPA By-Laws Amended

In our appeals to the AFL, and more recently to the AFL-CIO, we were repeatedly confronted with the fact that we would not permit this group of non-pilot flight engineers full membership in the Air Line Pilots Association with all of the rights and privileges afforded pilots. This fact was brought out in the 14th Convention in 1956, and the By-Laws of ALPA were amended so as to provide full membership and full representation for these people.

The AFL-CIO was subsequently advised of this action and the Association solicited their help to resolve this difficult problem. In the meantime, the FEIA repeatedly charged the Air Line Pilots Association with various wrongdoings and requested from the AFL-CIO that the Air Line Pilots Association be expelled from membership in this organization. Hearings were held by subcommittees of the Executive Council, and none of the allegations were ever substantiated by the FEIA. However, the continual fighting between our two organizations within the AFL-CIO finally pointed out to the Executive Council the seriousness of this jurisdictional problem.

AFL-CIO Findings

On February 24, 1958, the Association was advised by Mr. George Meany, president of the AFL-CIO, that the recommendation of the subcommittee of the AFL-CIO Executive Council had been adopted by the entire AFL-CIO Council. I will quote from the subcommittee recommendation: "The committee, after hearing the arguments of both the FEIA and ALPA, can find no trade union reason why the merger of these two organizations should not become a

reality." In Mr. Meany's cover letter, he stated: "May I point out in connection with the recommendations of this report that this office stands ready to assist the officers of the ALPA and FEIA in any way possible in an effort to find an amicable solution to the problems involved."

Current ALPA and FEIA Positions

The Air Line Pilots Association immediately advised the AFL-CIO that we were ready to start merger talks, however, the FEIA has refused to even discuss it.

The issues involved here are very simple and very basic. The Air Line Pilots Association firmly believes that jurisdictional fights in the cockpit over who should do what work are completely out of the question. The flight engineers stated position is that certain duties and *responsibilities* must be given to their members. The CAR makes it very clear who is responsible for the safety of the flight, and it is *not* the flight engineer.

Conclusions

As long as there is friction between the flight deck operating crew members, the inherent safety of the operation will be jeopardized and the proper requirements of the crew members hampered. Anyone who doubts this only has to look to the railroads to see what has happened. The engineers have been fighting the firemen for seventy-five years, and while this was going on, the conductors took over the responsibility for the operation of the train. The men with long experience in the trade union movement all recognize the necessity of correcting this particular mistake. The machinery within ALPA has been set up to accomplish this fairly for *all* people involved. The FEIA prefers to jeopardize the safety of the traveling public to accomplish their selfish purposes through power type collective bargaining.

The question before us is simple: Can we discharge our responsibility for the safety of the traveling public with a member of our crew on a few air lines who is responsible to no one and determined to perpetuate himself in the narrowest sense even though unqualified to perform his job?

CAA Administrator Clarifies Emergency Authority

"Emergency Authority," Says CAA Head, "Is Imperative Because Only The Pilot Can Decide To Take Immediate Action In Emergency Situations."

AN AIR line commander's use of his emergency authority has been discussed on many occasions in recent years, informally between ALPA representatives, the CAB and the CAA.

Even more recently use of the authority and policies of the CAA in issuing citations for CAR violations have been the subject of an ad hoc conference of ALPA and CAA, and was debated at a panel forum during the Sixth Annual ALPA Air Safety Conference.

In response to the issues raised in the discussions, James T. Pyle, Civil Aeronautics Administrator, wrote President Sayen regarding the subject. The letter from Pyle herewith is reprinted in full:

"During a recent meeting of your Ad Hoc Committee with me and other representatives of the Civil Aeronautics Administration, we discussed the fact that some pilots may be apprehensive about the use of their emergency authority for fear of being 'second guessed' by personnel of the Civil Aeronautics Administration. The purpose of this letter is to allay any such apprehension and clarify our views on this important subject.

Pilot's Prerogative

"I am sure we all agree that the emergency authority of the pilot-in-command is imperative because in the last analysis only he can make the decision to take immediate action in emergency situations.

"The term 'emergency,' as used in the CAR, may be interpreted to mean an unexpected occurrence or condition requiring immediate action to meet its danger. Such an unexpected occurrence or condition might, under certain circumstances, include an icing condition, engine or structural failure, weather condition, danger of collision, etc. It is not the intent of the Regulation to require a situation or condition to become critical before such emergency authority may be exercised.

The pilot should make a common sense evaluation of the factors and information available to him. If, after such an evaluation, he reasonably believes an emergency exists, he is permitted to exercise his emergency authority and deviate from prescribed regulations and procedures to the extent required to avoid the danger.

Do Not Hesitate

I wish to make it clear that a pilot-in-command, when confronted by an emergency, should not hesitate to use his emergency authority if by so doing he can contribute to the safety of any flight under his command.

The emergency authority is a consistent extension of the pilot's responsibility for the safety of his flight and the standard of care required of the pilot in the ordinary conduct of his flight, i.e., 'the highest degree of care,' is equally applicable to his conduct in an emergency.

"The record shows that air line pilots generally have used their emergency authority in situations and in a manner permitted by the regulations. I assure you that pilots can and, indeed should, continue to do so without fear of recrimination.

Reasonable Actions

"Occasionally a situation may arise in which it is indicated that there was an improper exercise of such authority and we are required to investigate. However, the facts need only indicate that the pilot's actions were reasonable under the circumstances then facing him. This has been our policy in the past and it will continue to be in the future.

"I would appreciate your giving this letter wide publicity in your organization so that the pilots may be assured of our thoughts in this matter."

Training For Full Crew Qualification Produces Many Tangible Benefits

(Continued From Page 15)

Upgrading

The upgrading phase of a pilot's training is extremely important. Here we have a pilot who has successfully performed the duties of assisting the pilot in command for several years and now will be expected to display command abilities overnight.

During this phase of training, the pilot is under more of a mental strain than at any other time in his career because, at this time, his ability to assume command will be determined. Because of the importance of this phase of training, to both the carrier and the pilot, he should be advised of his progress at various times during this training. Additionally, because of personality conflicts, or other reasons, the trainee, or the flight instructor, should be permitted to request a change of instructors at any time without prejudice.

At least six months prior notification should be given the pilot scheduled for upgrading, so that he may make adequate preparation. The committee recommends that a detailed booklet be presented to the pilot explaining exactly what is expected of the trainee and what advance preparation to make. These include:

▶ **Ground School:**

- Command course.
- Aircraft refresher, if he flew equipment as copilot; if not, complete aircraft course.
- T Category course. CAR Part 4B.
- Simulator time, if available.
- Link, to practice instrument procedures.
- Emergency procedure training.
- CAR's with emphasis on ATC procedures and airport minimums.

Largest Magazine In ALPA History

This special training plans edition of THE AIR LINE PILOT *is the largest issue of the magazine the Association has published. Despite this, in order to fully cover all the aspects of the important subject of training it was necessary to omit some of the regular features appearing each month. They will be resumed in the next issue.*

▶ **Flight Training** with the number of hours required to bring the individual pilot up to an ATR level will, of course, depend on the individual and his past experience.

If the pilot has acted as a third pilot, then a second pilot, and possesses the Copilot ATR on the equipment to which he is being upgraded, he will not require as much time as the pilot who will be in the equipment for the first time.

If a pilot being upgraded feels it is to his best interest to request another period or two of instruction, he should be granted this request.

The committee recommends that all pilots must take upgrading training after the completion of three years and having completed 1,500 hours with the air line. This is desired so that it can be determined in this early part of the pilot's career whether or not he possesses command qualities and is able to obtain the Captain's or Copilot's ATR. The third pilot must be upgraded to copilot and the copilot must be upgraded to captain. This three-year period was selected as it is part of the pilot's early training exposure while he is more susceptible to training.

Captain Recurrent Training

Since the Civil Air Regulations require six-month proficiency Captain recurrent training periods, this training period could better be utilized to demonstrate the pilot's knowledge of systems and performance rather than an instrument check. Knowing the aircraft and its performance characteristics and limitations is more important than a demonstration of one's ability to fly on instruments. A brief demonstration of instrument proficiency during this period would be sufficient. The flight simulator or duplicator could better be utilized for demonstration of knowledge of instrument procedures.

The pilot's performance during a line check would also be a measurement of his instrument flying knowledge.

The above is not to be interpreted as a means of diluting the six-month training period but rather as a change of emphasis to systems and performance rather than on instrument flying technique.

This required flight training period must raise the pilot's professional standard, not merely maintain it.

Refresher Training

It is further recommended by the committee that, once each year, every pilot be scheduled for a 3-4 day period of refresher training at a centralized facility. During this period the pilot shall be given the following refresher training:

▶ Aircraft review with emphasis on modifications.

▶ Operations review with emphasis on incidents and actual experience.

▶ Aircraft performance as related to T-Category.

▶ Company-pilot relation discussion, including future planning and pilot responsibilities.

▶ Other related aviation subjects considered necessary to discuss, such as new Civil Air Regulations, new navigation aids and methods, new meteorological information, new operating environments, etc.

▶ Flight training periods using simulator and aircraft, with particular emphasis on standardization.

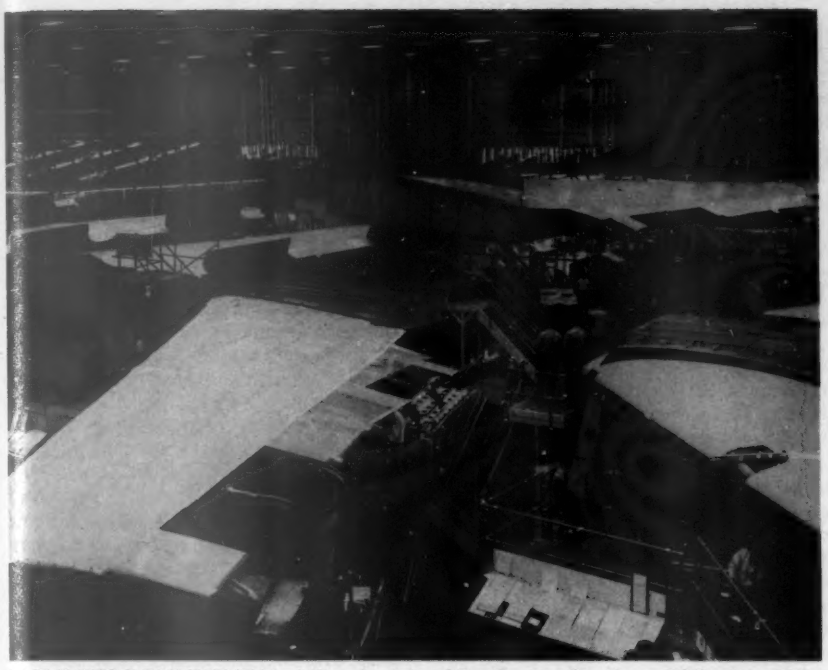
Aircraft and operation manual revisions and pilot bulletins can be considered as part of recurrent training.

Conclusions

Dictated by operational requirements, Captain transition can be a minor effort or a major effort. If the transition is made from unpressurized twin-engine aircraft to pressurized four-engine aircraft, considerable more ground school and flight time will be necessary. If the transition is made from one manufacturer's model to the same manufacturer's improved model, a day or two of ground school and two to four hours in the aircraft may be sufficient. These decisions will be made as a function of the ALPA monitoring machinery in co-operation with the director of training. In any case, the training must enable the Captain to meet the requirements for additional rating on his Air Transport License. Emphasis should be placed on complete understanding of the aircraft performance characteristics and limitations as described under CAR 4B.

Of great concern to the ALPA Training Plans Committee is the transitioning of Captains operating reciprocating engine aircraft to the new turbo-prop and jet types. Many new operational concepts will be introduced with these new aircraft.

Training provides well trained crews and safety on the flight deck as well as in the air. Result: An asset to the Company, Industry, and the Piloting Profession.



THE INTERCONTINENTAL: Wing Is Joined To Center Sections Of Boeing 707 - 320 Emphasizing Nearness Of Jet Age For Which Improved Training Is A Must

Good Carrier Training Organization Basic To Proper Crew Training

(Continued From Page 10)

To expect a pilot to become an electronics technician or an engine specialist is unrealistic. *Enough information to diagnose an impending or actual failure and the alternate source available would be sufficient without requiring detailed knowledge of the component.*

"When preparing flight training schedules, the problem of alloting instruction time to the various cockpit stations will require consideration. Too many students in the cockpit at one time leads to distraction and dilution of training. *No instructor should be responsible for more than one student station at one time.* It would be unrealistic to expect an instructor to simultaneously monitor and instruct a pilot flying the aircraft and a third pilot monitoring his station. This should not be interpreted as recommending the elimination of the cockpit observers.

"The publication of pilot aircraft manuals, operational bulletins, and other operational information should be under the supervision of the Director of Training in order to provide written material which will coincide with the oral classroom instruction.

"To insure uniformity and a minimum of confusion, the original ground school course should be compiled by the ground school instructors assigned to the various systems. These same instructors should be utilized to write and revise the aircraft manuals and the bulletins and operational information for presentation to the pilots.

"Before enumerating the desired qualifications of an air carrier pilot instructor, we wish to set forth the importance and scope of his position.

"The instructor is the important communication link between the aircraft manufacturer, the air carrier management, and the man who will manipulate the controls of the finished product. It is his obligation to present to the pilot all the necessary information to allow the line pilot to perform his duties in a safe and efficient manner. Further, his information must be presented in such a manner that time is not wasted and to insure favorable line pilot response.

"There are two sources of flight instructor personnel: (1) career instructors with a background of commercial or military flight training, and (2) regular air line pilots interested in training techniques and programs. Some few large carriers have always embraced the concept of the career flight instructor. The career flight instructor is not a line pilot and he does all his flying in the training program. Most carriers select their instructors from experienced line pilots. Both philosophies have their advantages and disadvantages. If a carrier has had an established and successful training program for many years using the career flight instructor, there would be no need to change.

Instructor Qualifications

"This committee recommends, after complete study, the line pilot type flight instructor for the following reasons:

- The line pilot instruetor has a better knowledge of all systems under all operating conditions.
- The line pilot instructor has the opportunity of being rotated back to line flying regularly, so as not to lose contact with the problems of the line pilot. The value of this is recognized and utilized by most air carriers.
- The rotation method overcomes complacency and guards against instructors becoming too academic and intolerant.
- The line pilot instructor, being route and airport qualified, can be used during periods of peak traffic demands.
- The line pilot instructor has a better understanding of problems involved in crew coordination and standardization under actual line operating conditions.
- Time spent by a line pilot instructing improves his professional ability if he desires to return to the line after a period of instruction.
- This system gives the company a flexible supply source in that they are able to select instructors from the entire pilot group as the demand for flight instructors fluctuates.
- The line pilot instructor can be utilized as a line check pilot. This phase of training will become important economically in the future aircraft.
- The line pilot instructor is more capable of checking operational judgment.
- The line pilot instructor has a better knowledge of economic operational considerations.

"In choosing a flight instructor, the director of flight training should look for the following qualifications:

- Good basic pilot.
- Must enjoy instructing.
- Thorough knowledge of equipment and limitations.
- Ability to teach.
- Pleasant personality.

Ground School

"Ground school instructors possessing air line piloting experience would be most desirable. Some flight crew ex-

perience should be a prerequisite for a ground school instructor.

"The secret of a quality ground school is the instructor. Being a systems specialist is not nearly so important as possessing the ability to speak the pilots' language of practical application with which the pilot is familiar rather than mathematical data and academic detail. Instructors of maintenance and mechanic personnel should not be used to instruct pilots. Such instructors have a tendency to overemphasize detailed component description over which the pilot has no control.

"Ground school instructors should confine themselves to the presentation of facts and avoid presentation of personal opinions or evaluations. The oral instructions in the classroom must concur with the written material in pilots' handbooks.

"Every attempt should be made to keep the ground school interesting and informative enough for the pilot to welcome this opportunity for training. If the pilot resents the school, he will learn very little.

"Each course should have a well defined objective with the pilot made aware of why the course is being taught and what will be gained. These objectives should be outlined at the beginning of each course.

"The ground school instructor should never lose sight of the fact that the pilot ground school is conducted for operations and not to train pilots as mechanics.

"Ground school courses presented during any one day should be varied to maintain interest and avoid concentration on one subject.

"Course instructors should be familiar enough with related systems so that continuity can be maintained.

"All examination questions should be kept operational with practical figures and procedures.

"To supplement lecturing, extensive use should be made of mockups, films, cut-aways, etc."

Standardization

The word standardization is distasteful to some pilots in that it requires conformity to certain basic concepts and limitations. All endeavors have to have certain guiding basic fundamentals. Air carrier operations while conducted in an atmosphere of many variables still has its guiding factors and limitations. The performance figures of the new airframe and engine combinations will be well established as they go into service. Basic laws of physics apply to the senior man on the seniority list as well as the junior man. There will probably be some changes in operating procedure as experience is gained with the new aircraft. Initial standardized procedures will be based on facts existing today.

"What does standardization accomplish?

"The performance and limitations of an aircraft are well established. Systems operations are well thought out processes. There is usually only one right way of operating the aircraft under a given set of circumstances.

"Systems will respond to one right sequence of operation under normal conditions or under emergency conditions. Therefore, standardization of operation becomes necessary.

"While teaching the standard accepted method of operation, demonstration should be given, or discussion initiated, on the consequences developing when a pilot deviates from these standard operating practices.

"Standardization in training saves time in that an accepted operation is established and all concerned—the student pilot, the instructor, the check pilot or examiner—all know what to expect and what is expected of them during the training and evaluating work.

"Care should be exercised, however, that standardization does not progress to a point where individual initiative is retarded. If a pilot or group of pilots have a change in operating procedure to suggest, let them be heard. If the suggested change has merit and is worthwhile, it will likely be adopted.

"It will be the responsibility of the director of training to maintain standardization in the program. If a turnover of instructors exists, an instructors' handbook would be desirable to indoctrinate the new instructor. The new instructor should be exposed to several instruction periods to run through the maneuvers with the director of training or an assistant.

"The committee recommends complete standardization periodic checks be made of instructors to assure that deviation from standards is not taking place. Regular periodic meetings should be held with the director of training, check pilots and instructor pilots to evaluate the program and maintain complete standardization.

The Manufacturer's Role

"Pilot training considerations begin on the drawing boards of the aircraft manufacturer. The reliability, simplicity, or complexity of a system will determine the necessary pilot training time.

"All manufacturers have established training facilities for the benefit of their customers. It is here, at the manufacturer's facility, that the training program for a particular model aircraft is initially worked out. Usually a block of training time is agreed upon between the customer and the manufacturer. The customer will use this time as he desires, usually designating supervisory or instructor personnel to take the course. Because of economic considerations, all the carrier's pilots cannot go to the manufacturer for initial training, however desirable it would be.

"The selection of personnel to take the manufacturer's course is important for they will be charged with the responsibility of bringing back to the carrier the necessary information to be used in establishing the pilot program.

"In the past, the pilots selected for manufacturer training have received a comprehensive ground and flight course. These selected few are taught by the manufacturers' instructors, who have usually worked with the aircraft from drawing board to production. In most cases, the manufacturer provides system mockups and other visual training aids in his program.

"As the manufacturer-trained pilots return to disseminate all the operational information to the carrier line pilots, the economic forces begin to work. The manufacturer's three-week ground school is pared down to about one-third of this time for the line pilot. The twenty hours of dual instruction on the aircraft given the supervisory personnel is cut down about the same percentage as the ground school. In some cases, the manufacturer will supply some visual training aids in the form of view graph transparencies.

"Some manufacturers offer their customers system mock-ups and other training aids at additional cost.

"The committee believes that there has been too much dilution of the manufacturers' recommended course by the carriers in their actual line pilot training programs.

"The committee recommends that the CAA, the manufacturers and carriers exert every effort to make all emergency procedures as simple and straightforward as possible. No more than three initial memorized functions should be required to cope with any emergency situation. Three functions in proper sequence would be the maximum a pilot should memorize and perform satisfactorily in an emergency."

"On-the-Job Training"

A substitute phrase for the word, "experience," is "on-the-job training." On-the-job training will be depended

upon more than ever to gain experience on the new aircraft. On-the-job training is the only way to extend classroom or book knowledge into practical application. The more complete the classroom knowledge the easier and more productive will be the on-the-job application.

The Pilot Training Committee report states: "For many years the air carriers have placed the burden of training on the Captain, with the Captain assuming the role of on-the-job instructor. Training of the new pilot was accomplished on the line after a brief training session in the classroom and a minimum amount of flight time in the aircraft. After World War II, military-trained pilots were plentiful, with many possessing high qualifications on the present-day aircraft and a good general knowledge on subjects pertaining to the piloting profession. Since World War II, this source of trained pilots has diminished to the extent that the air carriers have found it necessary to hire pilots with minimum requirements and experience. And when military trained pilots are hired, they have little or no experience in piston-driven aircraft since they have been indoctrinated in the jet field. Since the piston-driven equipment will be with the industry for many more years, this jet experience will not be of value to the carriers or the pilot at this time."

Again the committee reported: "As traffic increases and the jet era approaches, it becomes quite apparent that 'on line training,' is outmoded. As the need for greater vigilance and safety is required in the cockpit, more training will have to be done at the respective air carrier's training centers.

"The newly employed pilot after initial training still lacks the overall know-how of his specific job and requires Captain supervision. This committee sincerely believes that the industry will always have some 'on line training,' because it is a necessary part of this profession and since experience cannot be taught in the classroom. However, the committee believes that this phase of training can and should be kept to a minimum so as not to burden the Captain with additional duties which can only serve to distract him from his basic responsibility to deliver his passengers to their destinations safely.

Many Variables

"Since in each carrier's operations there are many existing variables, brought about by size of the operation and the territory and climate through which the operations take place, it would be impossible for the committee to spell out the exact number of hours which should be spent in each phase of training. A large trunk carrier operating across the country, over all types of terrain, in all kinds of weather, should certainly spend more time on training than a carrier operating in the Caribbean area, where no icing or complicated ATC problems are encountered.

Monitoring Machinery

"This committee has outlined a general program for all phases of training and will set up the machinery to provide the details to maintain a minimum standard based on the particular carrier's operation. This machinery will consist of a Master Executive Council-appointed Training Plans Committee for each air line. The ALPA Executive Committee will appoint an ALPA Central Training Plans Committee to collect and keep current information on each carrier's program submitted by the individual carrier's Training Plans Committee. This information will be recorded and comparisons made. The individual air line Training Plans Committee will obtain information from the Central Training Committee to determine if their programs are up to standard. This machinery could function under or in conjunction with the present ALPA Engineering and Air Safety Department.

"Our committee will not attempt to spell out the number of hours of ground school for the various systems, at this time, and since the flight time required will depend upon the individual and equipment, no attempt will be made to dictate the required hours for each aircraft. However, through the information gathering machinery of the Training Plans Committee on each air carrier, comparisons will be made by the Central Training Plans Committee to evaluate the curriculum for each phase of training for each carrier. During this evaluation, consideration will be given to the type of operation, route structure of the operation, and training aids used. If a phase of a carrier's program is at wide variance with other similar operations, attempts will be made to determine the reason for the difference. If it is shown by this evaluation that a deficiency exists, efforts by the Air Line Pilots Association will be made to bring this deficiency up to the industry level.

"With such machinery and information, the Central Training Plans Committee, through the Individual Air Line Training Plans Committee, will be capable of assisting any air line in setting up a *detailed* training program with *complete study guide and course outline material.*

"The function of Individual Air Line Training Plans Committee which is to be appointed by the Master Executive Council of each air line, shall be:

- Send detailed, current information of their carrier's program to the Central Training Plans Committee for comparison and study.
- Implement suggested improvements by the Central Training Plans Committee.
- Monitor their carrier's training program to maintain minimum acceptable standards.
- Assist their carrier in formulating training program on new equipment put into service.
- Participate in probationary pilot evalution problems.

"The function of the Central Training Plans Committee, appointed by the ALPA Executive Committee, shall be:

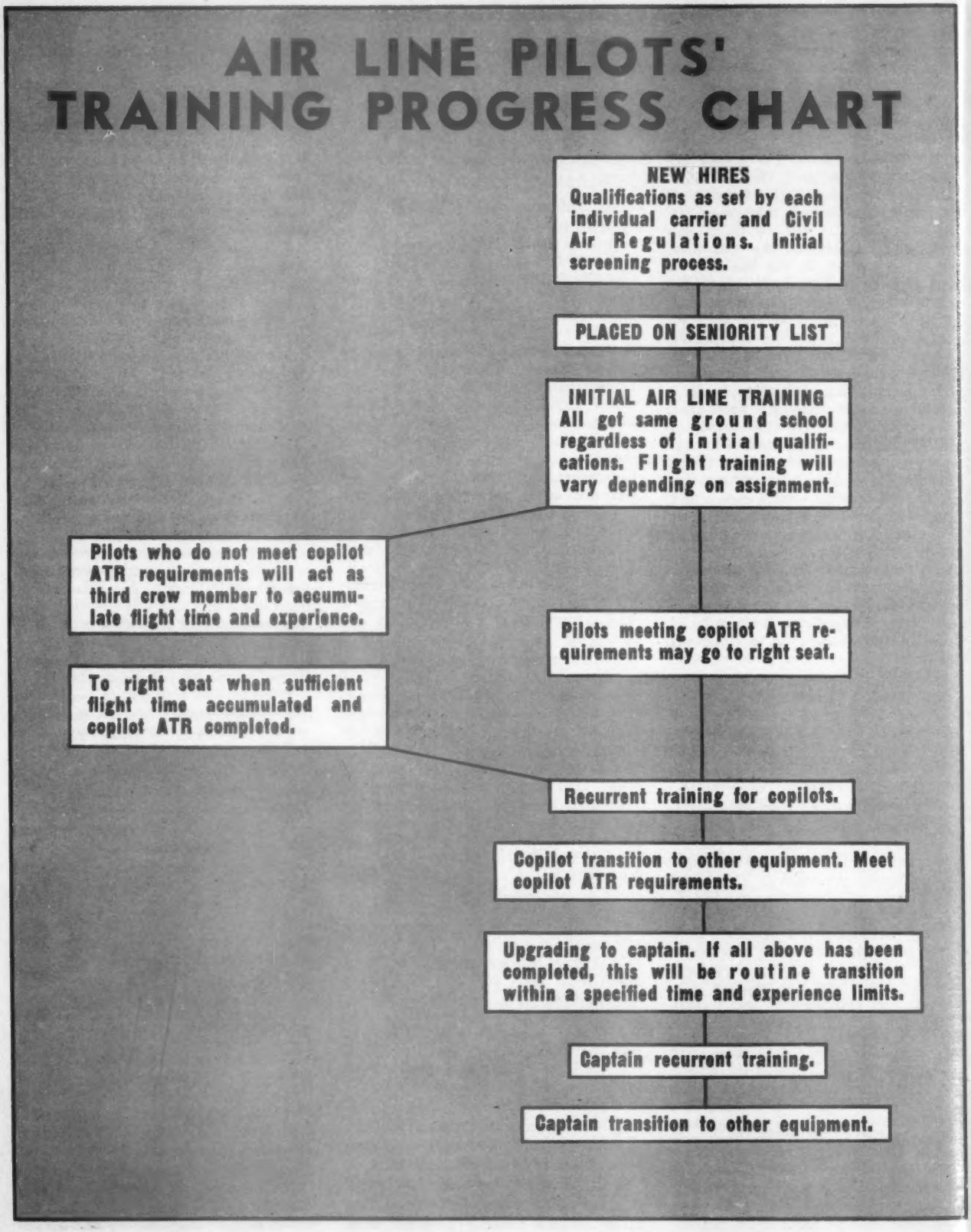
- Compile training information from each Individual Air Line Training Plans Committee.
- Records and compares the training programs for each type of equipment using charts, graphs, etc.
- Recommend improvements to an individual carrier's training program.
- Assist Individual Air Line Training Plans Committees in establishing a minimum training program for new equipment.
- In addition, the Central Training Plans Committee will be available:
  - To provide training information to *anyone* upon request and act as a clearing house for training information.
  - To work with the CAB and CAA on training problems.
  - To analyze accidents for training deficiencies.
  - To analyze, evaluate, and assist in development of new training aids.
  - To assist manufacturers in establishing training programs for new equipment.

"The accompanying chart (Facing Page) is based upon several important ALPA sponsored concepts:

- That there will be three pilots manning the turbo-prop and jet type transports.
- That the Civil Aeronautics Board will write into the Civil Air Regulations the Copilot Airline Transport License requirements as proposed by ALPA.
- That the ALPA training study machinery will function to monitor each carrier's training program.

"If the training curriculum as outlined by this chart and the contents of this report are used as a guide by the

AIR LINE PILOTS' TRAINING PROGRESS CHART


NEW HIRES
Qualifications as set by each individual carrier and Civil Air Regulations. Initial screening process.
PLACED ON SENIORITY LIST
INITIAL AIR LINE TRAINING
All get same ground school regardless of initial qualifications. Flight training will vary depending on assignment.
Pilots who do not meet copilot ATR requirements will act as third crew member to accumulate flight time and experience.
Pilots meeting copilot ATR requirements may go to right seat.
To right seat when sufficient flight time accumulated and copilot ATR completed.
Recurrent training for copilots.
Copilot transition to other equipment. Meet copilot ATR requirements.
Upgrading to captain. If all above has been completed, this will be routine transition within a specified time and experience limits.
Captain recurrent training.
Captain transition to other equipment.

carriers, many benefits will be realized by the industry. It will:

▶ Provide well trained 'Fail Safe,' pilot crew. Any pair of these three can function as a complete crew in case of any emergency. The 'Fail Safe,' concept is an inherent part of aircraft design and has contributed greatly to the considerable success of the air transport industry. Adoption of this concept as a primary objective in determining crew complement, training, and operating procedures becomes automatically mandatory.

▶ Provide an equally trained pilot crew, capable of more flexibility within the group with the elimination of a concentration of training in one man to the exclusion of training of another.

▶ Provide for concentration of training in the first three years of employment, when the pilot is at the lower end of the pay scale.

▶ Provide for more safety on the flight deck because of less on-the-job training.

▶ Insure that when time for upgrading approaches, the pilot will be a better product, with this upgrading stage becoming routine. The pilot will have been through sufficient training to function as a systems third pilot and next will possess an Air Transport Rating for Copilots for each type of equipment on which qualified. Upgrading will just require a refinement of technique and a display of 'Command,' ability."

ALPA's participation in pilot training programs is a natural step since it takes pilots to train pilots and most of the training must take place in the cockpit and on the job. ALPA can be an important guiding factor to assure that its members receive adequate training to maintain a high professional standing.

If ALPA's recommendations for training pilots from initial hire training through transitioning into jets is followed the pilots of our air lines will be among the best informed, the most efficient, and safest pilots in the world. The material is there in the form of pilots with years of experience in reciprocating engine aircraft. A well directed, well planned and well executed turbine powered training program will assure a high level of safety and efficiency for our industry. Anything less is unthinkable.

Transition To Turbo Props And Jets

(Continued From Page 21)

Since actual physical performance is the pilot's task, it is psychologically and practically unrealistic to expect them to learn by reading books or just listening to the spoken word."

Home Study Courses

The committee expended considerable effort in exploring the value and availability of Home Study Courses. The results of this study have led us to a strong conclusion that Home Study Courses are generally not successful. Percentage of successful completion is extremely low, even in the most interesting, well-directed and, best organized courses.

Training schools and educators have advised the committee that the home is not a suitable atmosphere for study due to the many obvious distractions. The lack of supervision and a pacesetter makes necessary extreme motivation for successful completion of a Home Study Course. However, if the individual pilot desires study material on any particular subject, there are many sources available, such as U.S. Government Printing Office, Technical Periodical Publishers, Manufacturers, University Extension Courses, Correspondence Schools, etc.

This study material should not be an examination type but something informative, interesting, and entertaining enough that the student retains the information without inducing an education atmosphere.

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Courses are not effective, the student learns just enough to pass the examination and then promptly forgets what he was supposed to learn.

It is recommended therefore, that the pilots be brought into a classroom for supervised training and study, if the subject is sufficiently important for pilot knowledge.

Route Qualifications

The committee has found that Route Qualification requirements of the Civil Air Regulations is an important part of training. However, as used today, it has lost much of this value. Many pilots are bundled into an aircraft, flown over the route and into and out of many airports in varying weather conditions, struggle through let-down procedures in poorly maintained Link trainers and are then considered route-qualified.

We believe this valuable time is mostly wasted. This same group of pilots, if brought into a pleasant classroom with their operating manuals and given a pictorial presentation of this same route and airports, using their manuals with adequate lecture throughout the pictorial presentation, would produce better route-qualified pilots. By using this method, a group of pilots can be better qualified over long routes of many days duration in a short period of time, at little cost, and with little inconvenience to the pilots and the carrier. This same facility can be used constantly for re-qualification and refresher information for regular and alternate airports.

There has been some feeling in the industry that route and airport qualifications could be completely abolished. We believe this would be a step backward. We feel that it is very important that the air line pilots be completely familiar with the routes and all its assortment of problems. Complete familiarization with all of the airports along a route, including the obstacles surrounding the airport and all approach procedures should be required.

Further expansion and adoption should be made of pictorial type qualification and that the Administrator of the Civil Aeronautics Authority, in order to maintain this at its highest quality, be given the authority to approve and monitor each individual carrier's application of same. The Individual Air Line Training Plans Committee will also assist in establishing and monitoring this type of route qualification.

Line Checking

Line checking of air carrier crews is required under Civil Air Regulations, and it is the opinion of the committee that *"line training"* will be a more important function on the turbo-prop and jet type aircraft. When these new aircraft are integrated into a carrier's route pattern, there will be a period during which new operating problems and philosophies are worked out. Many flights during this period of integration will be manned by pilots just released from the training programs. On these initial flights, a supervisor pilot or line instructor must take up where the transition instructor left off. Technique of enroute high altitude fuel management and navigation, terminal instrument penetration, high altitude weather flying, and emergency planning will constitute some of the on-the-job training areas for pilots stepping into this new type of operation.

If approached and executed in the proper manner, line training as specified by CAR and recommended above, will become a valuable training aid with little additional cost.

Since this line instruction will be the final phase of the transition training, the line instructors will be able to evaluate the quality of the entire training program.

This same approach can be coupled

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to the fulfillment of CAR requirements on present day aircraft.

The line instructor should not replace any pilot crew member when performing line checks or instruction. He should position himself at a station so that he can observe and monitor the entire crew as they perform their duties as a team. In this position he can monitor the Captain's Command Ability, division of duties, and crew coordination in performance of all procedures. The line instructor would also make it a part of his duties to ascertain that each cabin attendant is familiar with the location and use of emergency equipment.

Grading Systems

The committee found throughout the industry a wide variety of grading systems and their application. In such a well-established, compatible industry we can see no reasons for such differences. These variances tend to confuse people trying to analyze quality control. We believe a standardization in the use of these grading systems is long overdue.

The committee recommended that the grading system be standardized throughout the entire industry, using *"Satisfactory,"* or *"Unsatisfactory,"* as the grading reference.

The only deviation from this standard might be used in ground school grading.

There are too many variables involved in cataloguing a pilot with a specific value. Usually, this grade is only an expression of a personal impression gained by the grader, based on factors unrelated to pilot performance. Human limitations, personalities, seniority, and even affiliations very often have bearing on these grades. We believe, it is unfair to allow such evaluations to be used to differentiate between pilots.

The only true value is whether the pilot is completely qualified to perform his duties as an air line pilot and not whether he is better or worse than his fellow pilot. The real evaluation of his intelligence and ability is demonstrated through his performance over a period of time, not just in one brief session.

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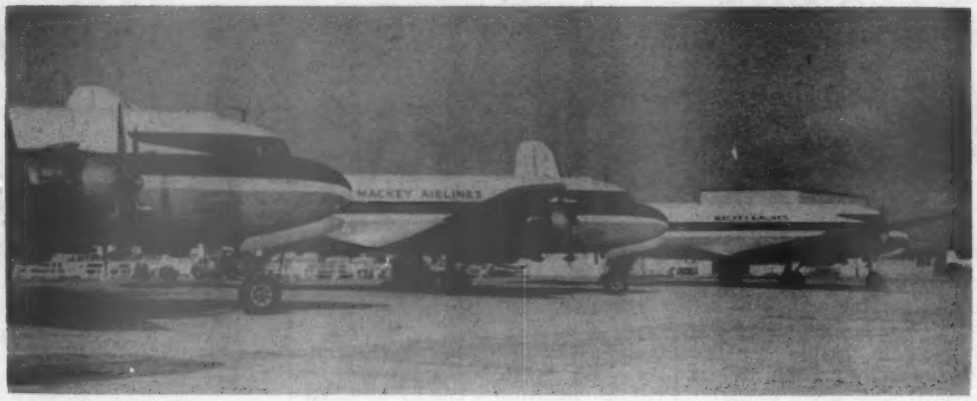

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